

# INDEXES, VOLUME TITLE AND CONTENTS FOR VOLUME 12

*Supplement to*  
*Journal of the American*  
*Water Works Association*  
*August, 1925, Vol. 14, No. 2*



## SUBJECT INDEX

- Absorption; definition, 291  
Acidity; acids comprising, 213  
    corrosion and, 419 seq.  
Adelaide, Australia; steel pipe, early  
    use of, 4  
Adrian, Mich.; hydrant revenue, 97  
    ownership, purification, rates, 88  
Adsorption; alumina and, 134  
    definition, 229, 291  
    hydrogen-ion concentration and,  
        229  
    manganese hydroxide and, 228 seq.  
Aeration; 270  
    iron removal and, 383  
    manganese removal and, 231 seq.  
Aerator; sprays and coke prefilters,  
    246  
Agitator; laboratory, with accurate  
    speed control, 238  
    water engine driven, Sacramento,  
        238  
Akron, O.; ownership, purification,  
    rates, 88  
Albany, N. Y.; filtration, 101, 103  
    main extension, financing, 95  
Albuquerque, N. M.; ownership, 88  
Algae; copper sulphate treatment  
    and, 307 seq.  
    hydrogen-ion concentration and,  
        243  
ice, blue coloration in, and, 309  
shallow water and, 209  
storage and, 211  
taste and, 307 seq.  
Algaecides; practice, 271  
    see Copper sulphate treatment  
Alizarin Red S; reagent for total  
    alumina, 439 seq.  
Alkalinity; lead solvency and, 422  
    seq., 427  
    see Calcium carbonate  
Allegheny, Pa.; steel pipe, early use  
    of, 3  
Allegheny River; flow regulation, 297  
    seq.  
Allentown, Pa.; main extension,  
    financing, 95  
    ownership, 88  
Alps; goiter and iodine, 76  
Altoona, Ger.; water filtration and  
    cholera, 101  
Alumina; adsorption, 134  
    alumina-free water, preparation,  
        439  
    precipitate, washing free of sul-  
        phate, 409  
    sulphate absorption, 406 seq.  
Aluminum; determination; colorimet-  
    ric with alizarin red S, 439 seq.  
    gravimetric, precipitate, wash-  
        ing free of sulphate, 409  
    precipitation by bacteria, 224, 232  
Aluminum sulphate; basic, 409  
American Committee on Electrolysis;  
    report, 128  
American Medical Liberty League;  
    nature of, 71  
American Public Health Association;  
    analysis, standard methods, 66, 127  
    water works standards and, 65  
American Railway Engineering Asso-  
    ciation; manual of, 267  
American Society for Testing Ma-  
    terials; corrosion research, 420  
    specifications, 64  
American Water and Electric Co.;  
    softening, 237 seq.  
American Water Works Association;  
    abstracts, and index to, 344  
    annual convention, New York,  
        1924, 127 seq.  
committees; abstracts, 344  
    contract, standard form of, 128  
drinking fountains, sanitary, 130  
filter sand testing and recording,  
    133  
industrial wastes in relation to  
    water supply; 131  
    report, discussion of, 410 seq.  
meters, standard specifications,  
    128  
pumping station betterments, 132  
    report, discussion of, 428 seq.  
purification processes, prac-  
    ticable loadings of, 134  
services; private fire protection,  
    128  
    standardization of, 132  
    report, discussion of, 417 seq.  
water analysis, standard  
    methods, 133 seq.

- water, standards for satisfactory drinking, 130  
 water works materials, testing, 132  
 watershed protection, 131  
 Divisions; chemical and bacteriological; annual meeting, 133 seq.  
 name of, changing, 134 seq.  
 fire protection, 129  
 plant operation and management, 131  
 index of abstracts, 344  
 membership, Hill cup for, 135  
 standardization council, report, 128  
 manual, preliminary statement, 267 seq.  
 Texas Water Works Association and, 130  
 water analysis, standard methods, 66, 127  
 water works practice, manual of, 127  
 topics and assignments and preliminary statement, 267 seq.  
 water works standards, 65  
 American Water Works and Electric Co.; turbines, 430  
 American Water Works Manufacturers' Association; annual meeting, 129 seq.  
 American Wood Pipe Co.; 30  
 Amsterdam, N. Y.; ownership and rates, 88  
 revenue from fire protection, 96  
 Anaconda, Mont.; gratuitous water and, 97  
 ownership, 88, 97  
 purification, 88  
 Ann Arbor, Mich.; gratuitous water and, 97  
 main extension financing, 95  
 ownership, 88  
 rates, 88  
 revenue from fire protection, 96  
 Anuraea; storage and, 211  
 Apulian Aqueduct, Italy; 1  
 Aragonite; formation, conditions for, 245  
<sub>see</sub> Calcium carbonate  
 Ashland, Wis.; gratuitous water and, 97  
 ownership, 88, 97  
 purification, 88  
 rates, 88  
 Asphaltic paint; value for coating pipes, 52  
 Asterionella; storage and, 211  
 Atchison, Kans.; gratuitous water and, 97  
 ownership, purification, rates, 88  
 Atlanta, Ga.; ownership, purification, rates, 88  
 Austin, Tex.; law re fire prevention, 183  
*Bacillus aerogenes*; *see* Bacteria, colon group  
 Bacteria; pathogenic, longevity in water, 268  
 Bacteria, colon group; carbohydrate fermentation by, 200 seq.  
 carbon dioxide—hydrogen ratio, 200 seq.  
 citric acid utilization by, 201 seq.  
 differentiation, 200 seq.  
 methyl red reaction, 200 seq.  
 Voges-Proskauer reaction, 200 seq.  
 uric acid utilization, 200 seq.  
 Bacteria, iron-depositing; 232  
 Baltimore supply and, 220 seq.  
 Bacteria, manganese-depositing; 232  
 Baltimore supply and, 220  
 Bacteria, silica-depositing; Baltimore supply and, 220  
 Bacteria, slime-producing; growths of on sand grains, Baltimore; oxygen and, 214 seq.  
 Bacteria, soil; acid production, 213  
 Bacterial content; *see* Bacterial count;  
*Bacterium coli*  
 Bacterial Count; storage and, 120 seq., 208  
 Bacteriological Examination; media; agar, use of dyes in, 133  
 dehydrated, use of, 284  
 training required, 284  
<sub>see</sub> *Bacterium coli* test; Voges-Proskauer reaction  
 Bacteriology; textbook of agricultural, 213, 232  
*Bacterium coli*; storage and, 208  
<sub>see</sub> Bacteria, colon group; *Bacterium coli* test  
*Bacterium coli* test; differential tests, 204 seq.  
 gentian violet broth and, 133  
 value of, 204 seq.  
<sub>see</sub> Bacteria, colon group; Voges-Proskauer reaction  
 Baltimore, Md.; cast iron pipe, early use of, 2  
 distribution system; flow tests, 165  
 investigation, 186, 189  
 filters, blocking with microscopic organisms, 209  
 Filter sand incrustation, 209  
 manganese and, 224  
 slime-producing bacteria and, 214 seq.  
 manganese troubles, 211 seq.

- microscopic organisms, blocking of filters with, 209  
ownership, 88  
rates, 88  
storage, water quality and, 206 seq.  
Bangor, Me.; gratuitous water, 97  
hydrant revenue, 96  
ownership, purification, rates, 88  
Bartlett Brook supply, 299  
Baton Rouge, La.; ownership, rates, 88  
Battle Creek, Mich.; ownership, purification, 88  
Bay City, Mich.; financing, 96  
gratuitous water, 97  
hydrants, 96  
ownership, purification, 88  
Bayonne, N. J.; ownership, purification, 88  
Bedford, Mass.; gratuitous water, hydrant revenue, 97  
ownership, rates, 88  
Bedford Hills, N. Y.; red-producing organism in swimming pool, 248 seq.  
Beloit, Wis.; gratuitous water, ownership, 97  
Billings, Mont.; gratuitous water, 97  
hydrant revenue, 96  
ownership, purification rates, 88  
Binghampton, N. Y.; ownership, purification, rates, 88  
Birmingham, Ala.; turbine tests, 430  
Bitumastic enamel; composition, 51  
value as pipe coating, 50 seq., 56  
Bleaching; *see* Cotton bleaching  
Boiler; appliances; coal consumption and, 301  
size of installation and, 303 seq.  
coal consumption; appliances and; bonus system and, 301  
Dutch Ovens, 302, 304  
practice; Charleston, 302 seq.  
Lexington, 301  
Stirling installation, Lexington, 302  
Stoker, 433  
hand, 302, 304  
mechanical; 304  
size of installation and, 304  
Boiler compound; composition, 291, 294  
Boiler corrosion; sodium sulphate formed by soda ash treatment and, 293 seq.  
Boiler feed water; calcium carbonate and sulphate, scale and, 242 seq., 288 seq.  
carbonates, scale and, 242 seq., 288 seq.  
pump; reciprocating, efficiency, 438  
turbine-driven, non-condensing, 431  
skimmer, use of, 294  
sodium sulphate, corrosion and; foaming and, 290 seq.  
sulphates, scale and 242 seq., 288 seq.  
treatment; alum, scale and, 242 seq.  
boiler compound, 290 seq.  
cost, relative, 294  
hardness and, 294  
overheating and, 292  
scale and, 290 seq.  
chemistry of, 288 seq.  
colloids, scale and, 290 seq.  
cost, relative, compound and lime-soda, 294  
economy of, 402  
lime-soda, relative cost, 294  
sludge formation, overheating and, 292  
soda ash; corrosion and, 290 seq.  
foaming and, 290 seq.  
scale and, 289 seq.  
Boiler foaming; sodium sulphate formed by soda ash treatment and, 290 seq., 294  
Boiler overheating; boiler compound and, 292  
sludge formation and, 292  
Boiler scale; alum treatment and, 242 seq.  
calcium carbonate and sulphate and, 242 seq., 288 seq.  
carbonates and, 242 seq., 288 seq.  
chemistry of, 288 seq.  
hardness of, conditions determining, 288 seq.  
pressure and, 289  
prevention; boiler compound; colloids, 290 seq.  
soda ash treatment, 289 seq.  
Bosmina; storage and, 211  
Boston, Mass.; cast iron pipe, early use, 2  
Boston Metropolitan Water District; water supply for Northeastern Mass. and, 299  
Boulder, Colo.; gratuitous water; ownership, 97  
Brantford, Ont.; practice re testing of auxiliary engines, 197  
Brass; corrosion, hydrogen-ion concentration and, 242 seq.  
specifications, standard, 269  
Brazil, Ind.; gratuitous water; ownership, 99  
Breckenridge, Tex.; manganese deposits in filters, 232

- Bridgeport, Conn.; gratuitous water, 97  
     ownership, rates, 88
- Bristol, Conn.; gratuitous water, 97  
     hydrant revenue, 96  
     ownership, rates, 88
- Brockton, Mass.; gratuitous water, 97  
     ownership, rates, 88
- Brookline; corrosion; deferrization, 422
- Brooklyn, N. Y.; distribution system improvements; flow tests, 165
- Brunswick, Me.; gratuitous water, 97  
     hydrant revenue, 96  
     ownership, rates, 88
- Bryozoa; odors and, 208 seq.  
     sludge formation and, 208 seq.  
     storage and, 208 seq., 219
- Buffalo, N. Y.; distribution system improvements, 163
- Burlington, Ia.; ownership, purification, rates, 88
- Butte, Mont.; ownership, purification rates, 88  
     water supply, 1
- Cairo, Ill.; ownership, purification, 88
- Calcite; formation, conditions for, 245  
     *see* Calcium carbonate
- Calcium carbonate; boiler scale and, 242 seq., 245, 291  
     crystalline formation, conditions determining, 245, 291  
     equilibrium curve, 225  
     solutions, lead solvency of, 422 seq.  
     *see* Alkalinity; Aragonite; Calcite
- Calcium sulphate; boiler scale and, 242 seq., 291  
     crystalline formation, conditions determining, 291
- California; softening in, 403
- California Section; membership, 135
- Cambridge, Mass.; corrosion prevention, 241 seq.  
     hardness, 242
- Camden, N. J.; ownership, rates, 88
- Camps; chlorination, 278
- Canada; International Joint Commission and, 269
- Canadian Engineer, 100, 191
- Canton, O.; ownership, rates, 88
- Carbon dioxide; corrosion and, 213 seq., 248 seq., 419 seq.  
     hydrogen-ion concentration and, 243
- Carbon dioxide removal; Brookline, 422
- Lowell, 233  
     sprays and coke filters, 247 seq.
- Carbonation; flue gas and, 239
- Carbondale; copper sulphate treatment and taste, 307 seq.
- Cartierville, Que.; auxiliary engines, 129
- Catalytic action; book, 233
- Catawba River, 430
- Cedar Rapids, Ia.; ownership, 88  
     purification, pH and, 106  
     rates, 88  
     sedimentation, 104 seq.  
     water quality, 106
- Cedar River; chlorides, 104
- Cement; pipe lining, Portland vs. Natural Rosendale, 424
- Champaign, Ill.; ownership, purification, rates, 88
- Charleston, S. C.; boiler practice, 302 seq.  
     consumption, metering and, 303  
     copper sulphate treatment, 310 seq.  
     fire protection revenue; 96  
     sprinkler service charges, 333  
     forestation and forest fires, 348  
     leak location, 326  
     meter location records, 328 seq.  
     metering, 303  
     ownership, 88  
     pipe; cement-lined, 52 seq., 57  
         wood-stave, 52 seq.
- purification, 88  
     rates, 88, 314 seq.
- services; advance placement, 352  
     size allowed for sprinkler systems, 333
- Charlottesville, Va.; pipeline, 42
- Check valves; accessibility, 356 seq.  
     cross connections and, 355  
     inspection and testing, frequency, 356
- Chelsea, Mass.; gratuitous water, 97  
     ownership, rates, 88
- Chemical feed; chlorometer and, 277 seq.
- Decatur, Ill., 113
- Chemistry; *see* Colloid chemistry
- Chester, Pa.; gratuitous water, 97  
     ownership, purification, rates, 88
- Cheyenne, Wyo.; gratuitous water; ownership, 97
- Chezy formula; 55
- Chicago, Ill.; distribution system improvements, 165, 186  
     ownership, purification, rates, 88
- Chlorides; pollution and, 104
- Chlorination; apparatus; chlorine hydrate and, 274  
     chlorometer, 277 seq.

- control methods, 279  
corrosion, 273 seq.  
maintenance costs, 276  
operation, intermittent, and, 273 seq.  
climate and, 274  
color removal and, 241, 280  
cost, 276  
efficiency, 280  
extent of in United States, 272  
filtration and, 235  
history, 101 seq., 282  
lead solvency and, 427  
operators, 279 seq.  
small supplies and, 129, 272 seq.  
sodium hypochlorite and, 277  
sodium iodide treatment and, 78  
storage and, 122  
super-chlorination, 271  
taste and odor; coke plant waste and, 411 seq.  
illness and, 233 seq.  
law and, 411  
oil and, 233 seq.  
phenol and, 233 seq., 411 seq., 413 seq.  
seasonal occurrence, 411  
sedimentation and, 106  
*see* Dechlorination; Prechlorination; Purification  
Chlorine; commercial, purity of, 274  
determination, o-tolidin, manganese interference, 211  
Chlorine hydrate; formation in chlorination apparatus, 274  
Cholera; filtration and, 101  
Cincinnati, O.; filtration investigation, 101  
fire prevention, law and, 183  
main extension financing, 94  
ownership, purification, rates, 89  
Cladocera; storage and, 211  
Clarifier; *see* Dorr Clarifier  
Clarksburg, W. Va.; ownership, purification, rates, 89  
Cleveland, O.; alum-chlorine treatment, 241  
chlorination, tastes and odors, 411 seq.  
fire prevention, law re, 183  
goiter, prevalence, 85  
main extension financing, 95  
ownership, 89  
prechlorination, 241  
purification, 89  
rates, 89  
sodium iodide treatment, estimated cost, 79  
Coagulation; alkalinity and, 407, seq. chemistry of, 129  
chlorination and, 240 seq.  
color removal and, 241  
dosage required; 113, 121 seq., 207 seq., 236 seq., 240 seq.  
determination, 113  
ferrous sulphate and, 225 seq., 246  
floc; composition, 405 seq.  
formation, 207  
hydrogen-ion concentration and, 242, 244, 405 seq.  
manganese removal and, 225 seq.  
microscopic organisms and, 208  
residual alum, 244  
soda ash treatment and, 242  
softening with lime and, 244  
storage and, 122, 207  
temperature and, 121  
turbidity and, 121, 207  
Coagulation basin; colored and turbid waters and, 270  
*see* Settling basin  
Coal; *see* Boiler  
Cobalt chloride; variations in, 133  
Cock, corporation; loss of head in, 269  
Coke plant waste; disposal by coke quenching, 414  
law and, 415  
taste and, 411 seq.  
Colloid; adsorption and, 291  
boiler scale and, 290 seq.  
crystallization and, 290 seq.  
definition, 290  
Colloid chemistry, 271  
Color; coagulation and, 121  
cotton bleaching and, 247  
determination, permanent standards, variation in, 133  
reservoir, unstripped, and, 118  
well water with high, 247  
Color removal; chlorination and, 241, 280  
coagulation basins for, 270  
Colorado Springs, Colo.; ownership, rates, 89  
Colorimetric standards; color transmittancy curve, 133  
permanent, variations in, 133  
Columbia, S. C.; ownership, purification, rates, 89  
Columbus, O.; ownership, purification, rates, 89  
softening, sand incrustation and, 239  
Compensation; for water diversion, 269  
Concord, Mass.; financing, 96  
ownership, rates, 89  
Concord, N. H.; ownership, rates, 89  
Condenser; water works vs. marine, 431 seq., 436

- Conflagration; Paterson, N. J., 163  
 Connecticut; sprinkler service charges, 331  
 Consumption; Charleston, S. C., 303  
 classification, desirability, 346  
 Decatur, Ill., 114  
 fire protection and, 189  
 manufacturing and, 269  
 metering and, 303  
 requirement of individual, 72  
 Rochester, N. Y., 72  
 tabulation of, 269  
 Continental Pipe Co.; wood stave pipe, 30  
 Contract; standard form, 270  
 report of committee on, 128  
 Coolgardie, Australia; pipeline, 1, 4, 49  
 Copepoda; storage and, 211  
 Copper and Brass Research Association, N. Y., 425  
 Copper sulphate treatment; application, 310  
 to ice-covered reservoir, 132, 307, seq.  
 copper; deposition of, 83, 309 seq.  
 residual, absence of, 310  
 cost, 308  
 Dinobryon and, 307 seq.  
 goldfish and, 310  
 organisms resistant to, 249  
 seeding and, 310  
 Synura and, 307 seq.  
 taste and, 71, 307 seq.  
 temperature and, 310  
*see* Algaecides  
 Corethra; storage and, 211  
 Corrosion; acidity and, 213, 419 seq.  
 alkalinity and, 422 seq., 427  
 carbon dioxide and, 213, 248, 419 seq.  
 chlorine and, 273 seq., 427  
 composition of metal and, 420  
 electrolysis and, 422  
 galvanic action and, 420, 424  
 humidity and, 420  
 hydrogen-ion concentration and, 213, 241 seq., 419 seq., 422 seq., 427  
 over-voltage and, 420  
 oxygen and, 419 seq., 422  
 prevention; lime treatment, 422  
     soda ash treatment, 241 seq., 427  
     sodium silicate treatment, 422  
     protective films, 420 seq., 422 seq.  
 salt content and, 420  
 temperature and, 420 seq., 422  
 turbulent flow and, 420  
 velocity and, 420 seq.
- see* Boiler corrosion; Electrolysis;  
 Lead; Pipe; Turbine, steam  
 Corrosiveness; test of, 243  
 Cost; boiler feed water treatment, relative, 294  
 chlorination, 275  
 apparatus, maintenance, 275  
 copper sulphate treatment, 308  
 Diesel engine; 388 seq.  
     maintenance, 387  
     oil; fuel, 388, 392  
     lubricating, 388  
     operation, 195, 388 seq.  
 forestation, 349  
 labor, 270  
 packing, relative, 296  
 pipe; cast iron, 23 seq., 37 seq.  
     cement-lined, 53  
     concrete, 26 seq., 37 seq.  
     joints, leadite, 321  
     steel, 23 seq., 37 seq.  
     wood, 28 seq., 37 seq.  
 pumping, Diesel, 389 seq., 392  
 purification, Decatur, Ill., 124 seq.  
 services; brass, copper, galvanized iron, lead, 426  
 soda ash, 242  
 sodium iodide, 72  
 sodium iodide treatment, 70, 74, 79  
 softening, municipal and household, 403 seq.  
 water, New Britain, Conn., 392  
 water works materials, 270  
 Cotton bleaching; water quality and, 247  
 Council Bluffs, Ia.; ownership, purification rates, 89  
 Covington, Ky.; ownership, purification rates, 89  
 Crenothrix, 233  
     filter sand incrustation and, 215 seq.  
 Cretinism; iodine and, 76  
 Switzerland, 80  
 Cross connections; check valves for, 355 seq.  
 Crustacea; storage and, 219  
 Crystallization; colloids and, 290 seq.  
 Curvature, 228, 233  
 Cuyahoga River; chlorination tastes and odors, 411 seq.  
 Cyclops; storage and, 211  
 Dallas, Tex.; gratuitous water, 97  
     hydrant revenue, 96  
     ownership, purification, rates, 89  
 Daphnia; storage and, 211  
 Darley (W. S.) and Co., Chicago; leak locator, 325 seq.

- Davenport Water Co.; gratuitous water, 97  
purification, 89, 237  
rates, 89  
settling basin improvements, 237  
Dayton, O.; ownership, purification, rates, 89  
Daytona, Fla.; hydrant revenue, 96  
ownership, purification, rates, 89  
Decatur, Ill.; chlorination, 120 seq.  
coagulation, 121 seq.  
dosage required, determination, 113  
consumption, 114  
filtration, impounding reservoir and, 110 seq.  
main extension financing, 95  
ownership, 89  
purification, cost, 1915-24 inclusive, 124 seq.  
rates, 89  
Synura, taste and odor, 120 seq.  
water quality, 122  
Decatur Lake, 110  
Dechlorination, 271  
Defiance, O.; carbonation, 239  
DeLaval Steam Turbine Co., 437  
Delaware, O.; gratuitous water, 97  
ownership, purification, rates, 89  
Denver, Colo.; gratuitous water, 97  
hydrant revenue, 96  
ownership, 89  
pipe; concrete, leakage, 33  
wood-stave, experience, 36  
purification, 89  
rates, 89  
water supply, 1  
Denver Union Water Co., 5  
Depreciation, 269  
Des Moines, Ia.; financing, 95  
gratuitous water, 97  
ownership, purification, rates, 89  
Detroit, Mich.; distribution system improvements; flow tests, 165, 186  
main extension financing, 95  
ownership, 89  
pipe, steel, early use, 3  
purification, 89  
rates, 89  
Diatoms; storage and, 211  
Diffugia; storage and, 211  
Dinobryon; copper sulphate treatment and, 307 seq.  
storage and, 211  
taste and, 307 seq.  
Distribution system; cross connecting, 175 seq.  
dead ends; fire protection and, 171 seq.  
vibration and, 198  
design, fire insurance rates and, 129  
fire protection and, 129, 163, 169 seq.  
flow test methods, 129, 162  
nomenclature, 269  
pressure tunnels, practicability, 269  
standards, physical, 269  
valves; closed fire protection and, 173, 189 seq.  
records, 190  
vibration, 196, 198  
Dolomite; goiter and, 86  
Dorr clarifier; removing sludge from settling basins with, 238 seq.  
Dover, N. H.; gratuitous water, 97  
ownership, purification, rates, 89  
Dover, N. J.; chlorination, 275  
Drinking fountains, 130, 271  
Dubuque, Ia.; ownership, purification, rates, 89  
Duluth, Minn.; gratuitous water, 97  
hydrant revenue, 96  
ownership, purification, rates, 89  
Duquesna, Pa.; ownership, 89  
Durham, N. C.; gratuitous water, 97  
hydrant revenue, 96  
ownership, rates, 89  
East Jersey Water Co.; filtration, rapid sand, 101  
Edgeworth, Pa.; gasoline engine, experience with, 429  
El Paso, Tex.; gratuitous water, 97  
hydrant revenue, 96  
ownership, 89  
Elbe River; water quality, 101  
Electric motors; protection, fuse vs. overload relay, 437  
Electrolysis, 269  
pipe insulation, 422  
Elgin, Ill.; main extension financing, 95  
Elmira, N. Y.; financing, 97  
ownership, purification, rates, 89  
Engine, Diesel; cost, 388, 391  
economy of, 191 seq., 132, 381 seq.  
efficiency; load and, 392  
size and, 381  
flexibility, 391  
life of, 387, 429  
load; efficiency and, 392  
sudden variations and, 385, 387  
maintenance, 387, 429, 435  
oil; fuel; consumption, 387  
cost, 388, 392  
foreign matter and, 386 seq.  
testing, necessity of, 387  
lubricating; consumption, 193, 387

- cost, 388  
 selection, care required, 387  
 operation, cost of, 195, 389 seq., 392  
 operators; number required, 435  
 training required, 385, 387, 392  
 pump drive, New Britain Conn., 391 seq.  
 pumping station drive, Gloucester, N. J., 132, 381 seq.  
 reliability, 387, 391  
 Semi-Diesel vs., 195  
 valves, regrinding, frequency, 386  
*see* Engine, oil
- Engine, gasoline; control, remote, 196  
 economy of, 191 seq.  
 life of, 429  
 maintenance, 429  
 noise, 196  
 odor, 196  
 oil, lubricating, consumption, 193  
 size, maximum, 195  
 Stirling installation, Lexington, 301 seq.  
 underwriters' requirements, Quebec, 199  
 vibration and, 196
- Engine, oil; control, remote, 196  
 economy of, 191 seq.  
 noise, 196, 198  
 odor, 196  
 size, maximum, 197  
 speed regulation, 197  
 vibration and, 196
- Engine, semi-Diesel; Diesel vs., 195  
 economy of, 191 seq.  
 lubricating oil requirements, 193
- Engine, steam; efficiency, size and, 381
- Engineering instruments; development and manufacture, 129
- England; goiter, dolomite and, 86
- Enteritis; water purification and, Michigan, 286 seq.
- Epistylis; storage and, 211
- Erie, Pa.; ownership, purification, 89  
 steam turbines, 430
- Europe; fire loss, 179
- Everett, Mass.; gratuitous water, 98  
 ownership, purification, rates, 89
- Extensions, financing; balance budgets and, 270  
 data on, various cities, 94 seq.
- Fairhaven, Mass.; meters; records, repairing, 329
- Fall River, Mass.; ownership, rates, 89
- Filter gravel; analysis, 271
- Filter sand; analysis, 271  
 committee report, 133
- decaying organic matter and, 213 seq.  
 incrustation; composition, 122 seq.  
 crenothrix and, 215  
 manganese and, 224, 230, 232  
 microscopic organisms and, 209, 214 seq., 231 seq.  
 prechlorination and, 214, 231 seq.  
 removal; carbonation and, 239  
 iron sulphate coagulation and, 245  
 soda ash and caustic soda treatment, 235 seq.  
 slime-producing bacteria and, 214 seq., 231 seq.  
 softening and, 230, 245
- Ottawa, Ill.; silica sand, data, 122 seq.
- Filter sand washer; Nichols, 209, 231
- Filtration; chlorination and, 235  
 cholera and, 101  
 microscopic organisms and, 209  
 sedimentation and, 106  
*see* Purification
- Filtration, double, 103, 270
- Filtration, drifting sand; at Toronto, 241
- Filtration, pressure filters, 271  
 turbidity and, 341
- Filtration, rapid sand, 270  
 history, 101  
 sand; condition, importance of, 235  
 data on, 247
- Filtration, slow sand, 270  
 history, 100  
 turbidity and, 341
- Financing; *see* Extension, financing
- Fir; redwood vs., 20
- Fire engine; pressure and, 171
- Fire hazards; area, 186 seq.  
 combustibility, 186 seq.  
 exposure, 168, 186 seq.  
 fire engine capacity, 186 seq.  
 height, 186 seq.  
 thawing pipes and hydrants electrically, 397
- Fire hose; length, maximum, 169
- Fire hydrants; distribution of, 169, 189  
 drips, care of, 354  
 feeders, size of, 172  
 flow test methods, 158 seq.  
 freezing, prevention, 354, 397  
 protection from damage, 339  
 revenue from; South Manchester, Conn., 335  
 various cities, 95 seq.
- specifications, 269  
 stems, packing, 296

- thawing, 354, 397  
use for purposes other than fire, 338
- Fire insurance rates; distribution system design and, 129
- Fire loss, 270  
economic significance, 129, 179 seq.  
extent, America and Europe, 179
- Fire prevention; law re, 183
- Fire protection; charges for, 95 seq., 270, 335  
cross connecting and, 175 seq.  
dead ends and, 171 seq.  
designing for, 129, 163  
fire streams, number, 178  
flow, 129, 168 seq., 186 seq., 189  
tests; methods, 129, 157 seq.  
value, 162  
main size, 172  
pressure, 168 seq., 270  
engine and, 171  
revenue from, 95 seq., 270, 335  
service size, 336 seq.  
storage and, 170  
valves, closed, and, 173, 189 seq.
- Fire protection, private; charges, 270  
services; committee report, 128  
use for other than fire purposes, 333 seq.
- see Sprinkler systems
- Fire streams; discharge measurements, 158  
hydraulics of, 158  
number, care required in determining, 178  
pressure and, 168 seq.  
fire engines and, 171
- Fire underwriters; gasoline engine requirements, Quebec, 199  
pumps, belted connections and, 197  
sprinkler service charges and, 334 seq.
- see National Board of Fire Underwriters
- Fish; see Goldfish
- Fitchburg, Mass.; ownership, rates, 89
- Flax; see Packing
- Flint, Mich.; gratuitous water, 98  
hydrant revenue, 96  
ownership, purification, rates, 89
- Flow; measurement, through outlets, 157 seq.  
area of no flow, measuring and allowing for, 158 seq.  
table for circular openings, 160
- see Weston's flow tables
- Forest fires; see Forestation
- Forestation; cost, 349  
fires and, 348 seq.  
ground conditions and, 348  
income from, 350  
runoff and, 350  
tree density and, 349
- Fort Scott, Kans.; hydrant revenue, 96
- Fragilaria; storage and, 211
- Framington, Mass.; gratuitous water, 98  
hydrant revenue, 96  
ownership, purification, rates, 89
- France; law re fires, 183
- Frankfort, Ky.; gratuitous water, 98  
ownership, purification, rates, 89
- Free ammonia; see Nitrogen as free ammonia
- Fremont, O.; ownership, rates, 89
- Fresno City, Cal.; gratuitous water, 98  
hardness and soap equivalent, 399 seq.  
ownership, 89, 98
- Galveston, Tex.; ownership, 90
- Gardner, Mass.; gratuitous water, 98  
ownership, rates, 90  
revenue from fire protection and city water, 97
- Gary, Ind.; steel pipe, experience with, 48
- Gas works' waste; disposal by coke quenching, cost, 414  
law and, 411
- General Electric Co.; 433, 437
- Geneva, N. Y.; ownership, purification, rates, 90
- Germany; law re fires, 183
- Glens Falls, N. Y.; forestation, 349 seq.
- Gloucester, N. J.; consumption, 388  
pumping costs, 389 seq.  
pumping station, Diesel engine driven, 381 seq., 434 seq.
- Gloversville, N. Y.; ownership, purification, rates, 90
- Goiter; dolomite and, 86  
exophthalmic, iodine and, 71  
hardness and, 86  
iodine and, 86 seq.  
iodine requirement, 73  
iodine tablets and, 73 seq., 81  
iodized salt and, 72 seq., 80  
prevalence; England, 86  
Great Lakes Region, 70  
New York State, 76  
Oregon, 86  
Rochester, 70  
Switzerland, 82, 86  
West Virginia, 77
- sodium iodide treatment of water and, 68 seq.

- Goldfish; copper sulphate treatment and, 310  
 Government requirements; discussion, 61 seq., 130  
 Grand Forks, N. D.; main extension financing, 95  
 ownership, purification, rates, 90  
 Grand Rapids, Mich.; goiter, iodine tablets and, 81  
 gratuitous water, 98  
 hydrant revenue, 96  
 ownership, purification, rates, 90  
 Gravel; *see* Filter gravel  
 Graves disease; *see* Goiter  
 Great Lakes Region; goiter prevalence, 70  
 Greenwood, S. C.; copper sulphate treatment, 310  
 Griffin, Ga.; iron removal at cotton bleaching plant, 246 seq.  
 Gunpowder River; coagulation, 405  
 manganese and, 212 seq.  
 Guthrie, Okla.; ownership, purification, 90
- Hackensack Water Co.; water shortage, 340  
 Hagerstown, Md.; ownership, purification, rates, 90  
 Hamburg, Ger.; cholera outbreak, 1892, 101  
 Hamilton, O.; gratuitous water, 98  
 ownership, 90  
 Hamilton, Ont.; water supply situation, 103  
 Hardness; city growth and, 107  
 goiter and, 86  
 laundry, life of clothes and, 401 seq.  
 soap waste and, 107, 400 seq.  
*see* Alkalinity; Calcium carbonate;  
 Calcium sulphate  
 Harrisburg, Pa.; main extension financing, 95  
 Hartford, Conn.; chlorination, 280 seq.  
 gratuitous water, 98  
 hydrants, 97  
 ownership, purification, rates, 90  
 Haverill, Mass.; ownership, rates, 90  
 Hemp; *see* Packing  
 Holland, Mich.; gratuitous water, 98  
 hydrant revenue, 96  
 ownership, 98  
 Holyoke, Mass.; gratuitous water, 98  
 ownership, rates, 90  
 Houston, Tex.; ownership, rates, 90  
 Hudson, N. Y.; filtration plant, 100  
 Hudson River; filtration and, 100 seq.  
 Humidity; corrosion and, 420
- Hutchinson, Kans.; gratuitous water, 98  
 ownership, purification, rates, 90  
 Hydrant; *see* Fire hydrant  
 Hydrogen-ion concentration; adsorption and, 229 seq.  
 algae and, 243  
 carbon dioxide and, 243  
 coagulation and, 242, 405  
 floc composition and, 406 seq.  
 residual alum and, 244  
 corrosion and, 242 seq., 419 seq., 422 seq.  
 purification and, 106  
 Hypochlorite; *see* Sodium hypochlorite
- Ice; blue color due to algae, 309  
 Illinois; hardness data, 107  
 water quality, 18 supplies, 358 seq.  
 Illinois River, 114  
 Illinois State Dept. of Health, 114 seq.  
 Illinois State Water Survey, 114 seq., 232 seq.  
 hardness in Illinois, 107  
 Independence, Mo.; ownership, purification, rates, 90  
 Indexing; discussion, 344 seq.  
 Indianapolis, Ind.; fire prevention, 184  
 Industrial wastes; *see* Pollution, industrial wastes  
 International Joint Commission on Pollution of Boundary Waters, 269  
 Iodine; physiological action, 84  
 world's supply, 74  
 Iodine treatment; sterilization by, 83  
 Iodization; *see* Sodium iodide treatment  
 Iodized salt; goiter and, 72 seq.  
 storage and loss of iodine, 74  
 Iowa Section; membership, 135  
 Iron; cotton bleaching and, 247  
 solution in water, mode of, 213  
 solution pressure, 421  
 Iron, cast; corrosion, composition and, 420 seq.  
 specifications, 269  
*see* Corrosion  
 Iron (ferric) hydroxide; floc, structural formation, 225 seq.  
 Iron removal, 223 seq., 232  
 aeration and filtration, 246 seq., 382  
 alkalinity and, 225 seq.  
 at Brookline, 422  
 floc, structural formation, 225 seq.  
 hydrogen-ion concentration and, 225 seq.

- Iron wrought; corrosion, 419 seq.  
*see* Corrosion
- Ishpeming Mich.; ownership, purification, rates, 90
- Jackson, Mich.; gratuitous water, 98  
ownership, purification, rates, 90
- Jackson, Miss.; ownership, purification rates, 90
- Jackson, Tenn.; ownership, rates, 90
- Jacksonville, Fla.; fire protection revenue, 96  
gratuitous water, 98  
ownership, 90
- Jamestown, N. Y.; gratuitous water, 98  
hydrant revenue, 96  
ownership, rates, 90
- Jersey City; ownership, purification, rates, 90
- Joseph, Mo.; ownership, purification rates, 90
- Jute; *see* Packing
- Kalamazoo, Mich.; hydrant revenue, 96  
ownership, 90
- Kansas City, Kans.; gratuitous water, 98  
hydrant revenue, 96  
ownership, purification, rates, 90
- Kansas City, Mo.; concrete pipeline, 43  
ownership, purification, rates, 90
- Kansas River; hardness, 109
- Kenosha, Wis.; fire protection revenue, 96  
gratuitous water, 98  
main extension financing, 95  
ownership, purification, rates, 90
- Keokuk, Ia.; gratuitous water, 98  
ownership, purification, rates, 90
- Kitchener, Ont.; gratuitous water, 98  
hydrant revenue, 96  
main extension financing, 95  
ownership, rates, 90
- Labor; price trends, 270
- Laboratory; agitator with accurate speed control, 238
- La Crosse, Wis.; ownership, rates, 90
- Lafayette, Ind.; gratuitous water, ownership, 99
- Lake; self purification, 270
- Lake Charles, La.; gratuitous water, ownership, 98
- Lake Forest, Ill.; hydrant revenue, 96  
main extension financing, 95
- Lancaster, Pa.; ownership, purification, rates, 90
- Lansing, Mich.; gratuitous water, 98  
hydrant revenue, 96  
ownership, purification, rates, 90  
water shortage, 342
- Laundry; softening, life of clothes and, 401 seq.  
staining, manganese and, 211 seq.  
prevention, 223
- Law; fire prevention and, 183  
government requirements and professional standards, 61 seq.  
police power, 61  
wastes, taste producing and, 411, 415
- water supplies; bonds and limits of legal indebtedness, 270  
health authorities and, 268
- Lawrence, Kans.; ownership, purification, rates, 90  
softening, 108 seq.
- Lawrence, Mass.; filtration, early, 101  
gratuitous water, 98  
ownership, rates, 90  
water supply situation, 299
- Lead; amounts, permissible, 423  
solvency; alkalinity, 422 seq., 427  
calcium carbonate solutions, 422 seq.  
chlorine and, 427  
hydrogen-ion concentration and, 422 seq.  
soda ash treatment and, 427
- Lead hydrotite; *see* Pipe joint materials
- Lead Poisoning; lead content, minimum, and, 423
- Milford, Mass., 422
- Leadite; *see* Pipe joint materials
- Leadite Co., Inc., Philadelphia; gasoline furnace, 320  
jute packing, 322
- Leakage; detection; 133  
Darley electric locator, 325 seq.  
geophone, 323 seq.  
wireless leak locator, 325 seq.  
*see* Pipe: Waste
- Leamington; distribution system, vibration, 198
- Lebanon, Pa.; ownership, purification, rates, 90
- Lexington Water Co.; boiler operation, 301 seq.  
rates, 91
- Lime treatment; corrosion and, 422

- Lincoln, Neb.; main extension financing, 95  
     ownership, purification, 91  
 Literature; indexing, 344 seq.  
 Little Falls, N. J.; filtration, 101  
     sand incrustation, removal, 235 seq.  
 Lockport, N. Y.; main extension financing, 95  
     ownership, purification, rates, 91  
 London, Eng.; filtration, 100  
 London, Ont.; financing, 96  
     gratuitous water, 96  
     ownership, purification, rates, 91  
 Lorain, O.; ownership, purification, rates, 91  
 Los Angeles, Cal.; main extension financing, 95  
     ownership, rates, 91  
     water supply, 1  
 Louisville, Ky.; filtration, 101  
     main extension financing, 95  
     ownership, purification, rates, 91  
 Lowell, Mass.; gratuitous water, 98  
     ownership, 91  
     purification, 91, 233  
     rates, 91  
 Ludington, Mich.; gratuitous water, 98  
     hydrant revenue, 96  
     ownership, purification, 91  
 Lynchburg, Va.; gratuitous water, 98  
     hydrant revenue, 96  
     ownership, purification, rates, 91  
     wood-stave pipeline, 42  
 Lynn, Mass.; ownership, rates, 91  
 McKeesport, Pa.; injunction re phenol wastes, 415  
 Macon, Ga.; hydrant revenue, 96  
     ownership, purification, rates, 91  
 Madison, Wis.; gratuitous water, 98  
     main extension financing, 95  
     ownership, 91  
     revenue from fire protection and city water, 96  
 Mains; air pockets, 21 seq.  
     air valves, 21 seq.  
     gate valves, 22  
     large; material for; comparison, 1  
         financially, 37 seq.  
     life, estimating, 34  
     repairing and relaying, 45 seq.  
     size of, 172  
     vacuum, 21 seq.  
     *see* Extensions financing  
 Manchester, Conn.; ownership, purification, 91  
 Manchester, N. H.; wood pipe, 5  
 Manchester, Vt.; gratuitous water, 98  
     ownership, rates, 91  
 Manganese; deposition, mode of, 214 seq.  
     incrustation and, 214 seq., 224  
     232 seq.  
     solution, mode of, 213 seq.  
     staining and; 211 seq.  
     prevention, 223  
 Manganese removal; 270  
     adsorption in filter and percolation beds, 224, 228 seq.  
     at Brookline, 422  
     coagulation with alum and, 227  
     coagulation with iron sulphate and, 224  
     precipitation, 224 seq.  
 Manganic hydroxide; alkali adsorptive power, 228 seq.  
     structural formation, 225 seq.  
 Manhattan, Kans.; softening, 108  
 Manufacturing; water consumption and, 269  
 Marion, O.; hydrant revenue, 96  
     ownership, rates, 91  
 Marquette, Mich.; hydrant revenue, 96  
 Mowership, purification, rates, 91  
 Maryland; Allegheny and Monongahela Rivers, flow regulation, and, 298  
 Massachusetts; hardness, 107  
     interstate supplies, 299  
     sprinkler service, charges for, 331  
     Massachusetts Institute of Technology; corrosion investigation, 419  
 Massachusetts State Board of Health; water and sewage purification investigation, 101  
 Masillon, O.; ownership, rates, 91  
 Mayo Clinic, Rochester, Minn.; exophthalmic goiter and iodine, 71  
 Melbourne, Australia; mains, practice re street, 50  
     pipe, steel and wrought iron, experience, 44 seq.  
 Melosira; storage and, 211  
 Memphis, Tenn.; purification plant, 42  
 Menominee, Mich.; chlorination, 282  
 Meridan, Conn.; gratuitous water, 98  
     ownership, purification, rates, 91  
 Meridian, Miss.; ownership, purification, rates, 91  
 Merrimack River, 299  
 Meter; chlorometer, 278  
     dimensions, universal, 330  
     records, 133, 318, 328 seq.  
     resetting, 328 seq.  
     specifications, 128, 269

- stem, packing for, 296  
testing; 133, 316 seq., 330  
    frequency, 318 seq.  
yoke, Ford, 317
- Metering, 269  
    Charleston, S. C., 303  
    consumption and, 303  
    Milton, Mass., 319
- Methuen, Mass.; water supply situation, 299
- Miami, Fla.; ownership, purification, rates, 91  
    well water of unusual color, 238
- Michigan; chlorination, 282 seq.  
    laboratories, 283  
    purification; enteritis and, 286 seq.  
    typhoid and, 285 seq.  
    water supply data, summary, 283
- Michigan, Lake; hardness, 108
- Michigan Pipe Co.; wood-stave pipe, 30
- Michigan State Board of Health;  
    water analysis, methods, 284  
    water supplies, supervision of, 282 seq.
- Microbiology; book, 232
- Microforces, 228, 233
- Microscopic organisms; blue-producing, 309  
    coagulation and, 121, 208  
    green-producing, 249  
    red-producing, 248 seq.  
    shallow water and, 206, 209  
    storage and, 120, 208 seq.  
    *see Algae*
- Middletown, O.; main extension financing, 95  
    ownership, 91
- Milford, Mass.; lead poisoning, 422
- Milton, Mass.; hydrants, 354  
    leak location, 325 seq.  
    meter testing, practice, 318 seq.  
    metering, 319  
    service, 424 seq.
- Milwaukee, Wis.; distribution system investigation, 165, 186  
    gratuitous water, 98  
    hydrant revenue, 97  
    main extension financing, 94  
    ownership, purification, rates, 91
- Minneapolis, Minn.; main extension financing, 94  
    ownership, purification, rates, 91
- Mississippi River, 430  
    chlorination and taste, 234  
    water quality, 100
- Missoula, Mont.; hydrant revenue, 96  
    ownership, purification, rates, 91
- Mobile, Ala.; ownership, purification, rates, 91
- Monongahela River; flow regulation, 297 seq.
- Montgomery, Ala.; ownership, 91
- Mount Clemens, Mich.; ownership, rates, 91
- Mount Kisco Laboratory, 248
- Mount Olive, Ill.; hardness, 107
- Mount Vernon, Ill.; manganese, 224, 233
- Muscatine, Ia.; ownership, rates, 91
- Nashville, Tenn.; ownership, purification, rates, 91
- National Board of Fire Underwriters;  
    flow required, formula, 186  
    flow tests, method, 157  
    rating schedule, 270
- National City, Cal.; gratuitous water, 98  
    ownership, rates, 91
- National Fire Protection Association;  
    services, size, 336 seq.  
    sprinkler service charges, 331 seq.
- National Tube Co., Boston, 3
- Nematodes; storage and, 211
- New Bedford, Mass.; leadite and lead hydrotite, experience with, 321 seq.  
    ownership, rates, 91
- New Britain, Conn.; main extension financing, 95  
    ownership, purification, rates, 91  
    White Bridge supply; cost of water delivered, 392  
    Diesel engine drive, 391 seq.
- New Castle, Ind.; gratuitous water, ownership, 99
- New Hampshire; interstate water supplies, 299
- New Haven, Conn.; *see New Haven Water Co.*
- New Haven Water Co.; chlorination 278 seq.  
    purification, rates, 91
- New Jersey Agricultural Experiment Station; sewage investigation, 133
- New Jersey State Dept. of Health;  
    sewage investigation, 133
- New Jersey State Utilities Commission; meter testing, ruling re, 317, 319
- New Orleans, La.; fire protection investigation, 164  
    ownership, purification, 92
- New Rochelle, N. Y.; gratuitous water, 98  
    ownership, purification, rates, 92
- New York City; chlorination, maintenance costs, 276  
    fire prevention law, 183

- ownership, 92  
 pipe; cast iron, 2, 50 seq.  
 steel, 50 seq.  
 purification, 92  
 rates, 92  
 services, 353  
 water supply; 1  
 Catskill supply, pollution, 131  
 iodine content, 85 seq.  
 waste detection, flow tests and, 166
- New York State; Allegheny and Monongahela Rivers, flow regulation, and, 298  
 chlorination taste and odors phenol wastes and, 413  
 goiter, prevalence, 76, 85  
 sprinkler service charges, 331  
 watersheds, forestation, 348
- New York State Conservation Commission; forest fires and, 348 seq.
- Newark, N. J.; fire prevention law, 183  
 steel, pipe, early use, 4
- Newark, O.; carbonation, 239  
 softening, sludge removal, 238 seq.
- Newberry, S. C.; water shortage, 340
- Newburyport, Mass.; fire service revenue, 97  
 ownership, purification, rates, 91
- Newport News, Va.; copper sulphate treatment, 310
- Niagara Falls, N. Y.; gratuitous water, 98  
 hydrant revenue, 96  
 ownership, purification, rates, 92
- Nichols Sand Washer, 209, 231
- Nitrogen as free ammonia; as indicator of pollution, 240
- Norfolk, Va.; gratuitous water, 98  
 mains, corrosion, 35  
 ownership, 92  
 pipe, concrete and wood-stave, leakage, 33  
 pipeline, concrete, 16 seq.  
 purification, 92  
 rates, 92  
 water supply, 1
- North Carolina Section; membership, 135
- Norwalk, Conn.; hydrant revenue, 96  
 ownership, rates, 92
- Norwich, Conn.; ownership, rates, 92
- Oakland, Cal.; gratuitous water, 97  
 ownership, purification, rates, 92
- Odor; Bryozoa, decomposition and, 209  
*see* Chlorination; Taste and Odors
- Ogdensburg, N. Y.; ownership, purification, 92
- Ohio; chlorination taste and odors, phenol wastes and, 413
- Ohio Conference on Water Purification; sodium iodide treatment, 70
- Ohio River; phenol wastes, 413 seq.
- Ohio State Dept. of Health; chlorination taste and odors, phenols and, 412
- Oil; fuel, cost, 388, 392  
 lubricating, cost, 388
- Oil wastes; chlorination taste and, 233 seq.
- Oil Pollution Act, 1924, 415 seq.
- Oklahoma City, Okla; hydrant revenue, 95  
 ownership, purification, rates, 92
- Olean, N. Y.; ownership, purification, rates, 92
- Omaha, Neb.; fire protection revenue, 95  
 main extension financing, 95  
 ownership, purification, rates, 92  
 sedimentation basins, cleaning, 131  
 steel pipeline, 58
- Ontario Hydro-Electric Power Commission; power failure and, 195
- Ontario, Lake; water quality, 240 seq.
- Oregon; hardness; goiter, 86
- Organic matter; iron and manganese and, 223  
 vegetation, decaying, products, 213
- Orientation, 228, 233
- Orthotolidin; manganese and, 211
- Ottawa, Ill.; silica sand, 122
- Ottumwa, Ia.; ownership, purification, rates, 92
- Owensboro, Ky.; ownership, purification, rates, 92
- Oxygen dissolved; bacteria, slime-producing, and, 214  
 corrosion and, 419 seq., 422  
 determination, micro apparatus for, 133
- Ozonization, 270
- Pacific Tank and Pipe Co.; wood-stave pipe, 30
- Packing; cost, relative, 296  
 flax, 295  
 friction and, 296  
 hemp, 295  
 jute, 295, 320, 322  
 pressure and, 295  
 rawhide, 295 seq.  
 wear and grooving, and, 295
- Paige and Jones Chemical Co., Inc.; Hammond, Ind.; boiler compound, composition, 294
- Paludicella; storage and, 211
- Panama Canal Zone; Agua Clara supply, lead solvency, 426 seq.

- Paris Academy Des Science; goiter and iodine, 76
- Paterson, N. J.; conflagration, 163  
gratuitous water, 98  
ownership, purification, rates, 92
- Pawtucket, R. I.; gratuitous water, 98  
hydrant revenue, 97  
ownership, purification, rates, 92
- Pedalion; storage and, 211
- Peekskill, N. Y.; ownership, purification, rates, 92
- Pennsylvania; Allegheny and Monongahela Rivers, flow regulation and, 298  
chlorination taste and odors, phenol wastes and, 413  
fire prevention law, 183  
fire service charges, 335  
stream classification, 410 seq.
- Pennsylvania Board of Fish Commissioners; stream classification 410 seq.
- Pennsylvania Dept. of Forests and Water: stream classification, 410 seq.
- Pennsylvania Dept. of Health; stream classification, 410 seq.  
water shortage regulations, 341 seq.
- Pennsylvania Sanitary Water Board; stream classification, 410 seq.  
taste and odor producing wastes and, 411
- Pensacola, Fla.; ownership, rates, 92
- Peoria, Ill.; ownership, rates, 92
- Phenol wastes; taste and odors and, 233 seq., 411 seq.
- Philadelphia, Pa.; main extension financing, 95  
pipe, cast iron, 2  
water project, 43
- Phillipsburg, N. J.; ownership, rates 92
- Phoenix, Ariz.; water supply, 1
- Pierre, S. D.; manganese, 224, 232
- Pine Bluff, Ark.; ownership, purification, rates, 92
- Pine trees; relative resistance to fire, 348
- Pipe; corrosion, 269  
deliveries, distribution to avoid congestion, 305  
incrustation with manganese, 224 232 seq.  
merits, relative, 269  
thawing electrically, damage and, 395 seq.  
*see* Corrosion; Electrolysis; Services
- Pipe, brass; corrosion, resistance to, 422, 425  
services, use for and cost, 425 seq.  
tin-lined, 422
- Pipe, cast iron; breakage, danger of, 50  
carrying capacity and decrease with age, 32, 47, 49 seq., 53  
coatings; 48 seq.  
asphaltic paint, 52  
bitumastic, 50, 52, 56  
cement, 50, 53, 56, 59, 423  
coal tar, 52  
corrosion, 21, 34, 418 seq.  
cost, 23 seq., 37 seq.  
durability and life, 34, 418 seq.  
history, 2  
leakage, 33  
manufacture, 7 seq.  
specifications, 269
- Pipe, cement-lined; cement, Portland vs. Natural Rosendale, 424  
corrosion and, 36, 51 seq., 422 seq.  
cost, 53  
cutting, 425  
durability, 57  
friction loss, 48  
manufacture, 129, 424
- Pipe, concrete; carrying capacity, 32 seq.
- corrosion, 35 seq.  
cost, 26 seq., 37 seq.  
durability, 35  
head, maximum, 15  
history, 4  
joints, 4, 14 seq., 43  
leakage, 33, 43  
manufacture, 14 seq.
- Pipe, copper; corrosion, resistance to, 422  
services of, cost, 426
- Pipe, galvanized; corrosion, 417 seq.  
cost, 417, 426  
durability and life, 417, 419  
services of, cost, 426
- Pipe, iron; *see* Pipe, cast iron; Pipe, wrought iron
- Pipe joint materials, 133  
lead, 321  
lead hydrotite, 321  
leadite, 320 seq.
- Pipe, lead; corrosion, 417 seq.  
cost, 417 seq., 426  
life, of, 417  
services of, cost, 426
- Pipe locator; 325  
dead ends, location of, 326 seq.
- Pipe, steel; carrying capacity and decrease with age, 32, 48  
coatings, 48 seq., 58  
asphaltic paint, 52  
bitumastic, 50 seq., 56  
cement, 48, 50 seq., 55 seq., 59

- corrosion, 21, 34, 417, 419  
 cost, 23 seq., 37 seq., 48  
 durability and life, 3 seq., 34, 41,  
 46, 48, 58  
 flattening under reduced pressure,  
 57  
 friction, 48  
 galvanized, resistance to corrosion,  
 417, 419  
 history, 2  
 joints, 10 seq.  
 leakage, 33  
 manufacture, 10 seq.  
 repairing, 46  
 Pipe, tin-lined; corrosion, resistance  
 to, 422  
 Pipe, wood; carrying capacity, 32  
 seq., 53  
 cost, 28 seq., 37 seq.  
 durability, 5 seq., 20 seq., 36, 40, 42  
 history, 4 seq.  
 leakage, 33, 52 seq.  
 manufacture, 16 seq.  
 prejudices against, 59  
 redwood vs. fir, 20  
 Pipe, wrought iron; coatings, 45  
 cement, 423 seq.  
 durability, 45  
 galvanized, resistance to corrosion,  
 419  
 history, 2 seq.  
 repairing, 45  
 Pitot tube; flow tests with, 158 seq.  
 Pittsburgh, Kans.; ownership, 92  
 Pittsburgh, Pa.; filtration investiga-  
 tion, 101  
 flood prevention, 297 seq.  
 steel pipe, early use, 3  
 Pittsburgh, Pa., Flood Commission;  
 Allegheny and Monongahela  
 Rivers and, 297 seq.  
 Plumbing, 269  
 standardization, 63 seq.  
 vibration in distribution system  
 and, 198  
 white enamel, manganese, staining  
 with, 211  
 Pollution; indicator of, nitrogen as  
 free ammonia, 240  
 International Joint Commission on,  
 269  
 Pollution, industrial wastes, 269  
 coke plants, 411 seq.  
 gas works, 411  
 Oil Pollution Act, 1924, 415 seq.  
 phenol, 411 seq.  
 steel, 414  
 Pollution, watershed protection; 269  
 Polyarthra; storage and, 211  
 Pomona, Cal.; gratuitous water, 98  
 ownership, rates, 92  
 Porifera; storage and, 211  
 Port Huron, Mich.; hydrants, 338,  
 354  
 leadite, experience with, 320  
 main extension financing, 95  
 ownership, purification, rates, 92  
 services, 351  
 Portland, Ore.; fire prevention law,  
 183  
 ownership, rates, 92  
 revenue from city water, 95  
 Portsmouth, Va.; water supply, 1  
 Posen; iron and manganese precipita-  
 tion, 224  
 Jewel filter, experiments with, 233  
 Poughkeepsie, N. Y.; filtration, 100,  
 103  
 Prechlorination; coagulation and, 240  
 seq.  
 manganese removal and, 231 seq.  
 slime-producing bacteria on filter  
 sand and, 214, 231 seq.  
 Precipitation; chemistry of, 129  
 Pressure; domestic, 269  
 fire engines and, 171  
 fire streams and, 168 seq.  
 high pressure system, 270  
 measurement at hydrants, 158 seq.  
 Pressure gage; calibration, 158  
 Professional standards; 61 seq., 130  
 Protozoa; storage and, 211  
 Providence, R. I.; ownership, rates,  
 92  
 Pulmatella; storage and, 211  
 Pump; air lift, 382  
 boiler feed, 431, 438  
 centrifugal, 428, 438  
 condenser, water works vs. marine,  
 431 seq., 436  
 stuffing box, pressure and, 295  
*see* Packing  
 Pumping, 268  
 costs; Diesel engine drive; Glouce-  
 ster, N. J., 389 seq.  
 New Britain, Conn., 392  
 Pumping station; auxiliaries:  
 selection of, 428 seq.  
 steam vs. motor drive, 437  
 belted connections, 197, 391  
 committee report, 132  
 electrically driven, 428 seq.  
 Diesel engine driven, 132, 381, seq.,  
 391 seq., 428 seq.  
 heat balance, 431  
 practice, 268  
 stand-by units; oil, 191 seq., 197  
 testing, frequency, 197  
 steam extraction, 433 seq.  
 steam turbine driven, 428 seq.

- vibration, 198  
*see* Turbine
- Purdy, Lake; 430
- Purification; cost, Decatur, Ill., 1915-24, 124 seq.  
 development of, 100 seq.  
 enteritis and, 286 seq.  
 loading, report on, 134  
 self-purification, 270  
 typhoid and, 101 seq., 285 seq.
- Pyrenees; goiter, iodine and, 76
- Quebec; gasoline engines, underwriters' requirements, 199
- Quincey, Ill.; chlorination, taste, 233 seq.  
 ownership, purification, rates, 92
- Quincey Bay; chlorination, taste, 234
- Racine, Wis.; gratuitous water, 98  
 hydrant revenue, 96  
 main extension financing, 94  
 ownership, 98  
 rates, 92
- Raleigh, N. C.; ownership, purification, rates, 92
- Rates, 269  
 Savannah, Ga., 329  
 segregation of, 346 seq.  
 tabulation of, 234 cities, 87 seq.
- Rawhide; *see* Packing
- Reading, Pa.; main extension financing, 94  
 ownership, purification, rates, 92
- Records; 269, 271  
 meter records, 133, 318, 328 seq.
- Redwood; fir vs., 20
- Redwood Manufacturers Co.; wood-stave pipe prices, 28 seq.
- Rensselaer, N. Y.; gratuitous water, 98  
 ownership, purification, rates, 92
- Reservoirs; 269 seq.  
 stripping, color and, 118  
 water quality and, 118, 206 seq.
- Richmond, Ind.; gratuitous water  
 ownership, 99
- Richmond, Va.; alumina determination, 440
- River; *see* Stream
- Riverside, Cal.; fire protection, 188
- Riverton and Palmyra Water Co.;  
 meters, practice re, 317, 319  
 leadite, experience with, 320 seq.
- Roanoke, Va.; boiler practice, 303  
 gratuitous water, 98  
 ownership, purification, rates, 92
- Rochester, N. Y.; copper sulphate treatment, 71  
 goiter prevalence, 70
- iodine content, 85  
 ownership, 92  
 pipe, steel, early use, 4  
 rates, 92  
 revenue from city water and fire protection, 95  
 sodium iodide treatment, 68 seq., 103, 128
- Rotatoria; storage and, 211
- Sacramento, Cal.; agitators, 238  
 ownership, 92
- Saint Catharines, Ont.; gratuitous water, 98  
 hydrant revenue, 96  
 ownership, purification, 93
- Saint Joseph, Mich.; ownership, purification, 93
- Saint Louis; filtration investigation, 100  
 ownership, purification, 93  
 pumps, centrifugal, turbine-driven, 428 seq.  
 rates, 93
- Saint Paul, Minn.; gratuitous water, 99  
 hydrant revenue, 96  
 main extension financing, 94  
 ownership, purification, rates, 93
- San Antonio, Tex.; ownership, rates, 93
- San Francisco, Cal.; consumption, 403  
 gratuitous water, 98  
 hardness, 399  
 ownership, rates, 93  
 softening, 401 seq.  
 water supply, 1
- Sand; *see* Filter sand
- Sangamon River; discharge, 1919-24, 115  
 water quality, 116
- Savannah, Ga.; meters, 330  
 ownership, purification, 93  
 rates, 329  
 services, 351 seq.
- Scarsdale, N. Y.; meter testing with portable apparatus, 330
- Schenectady, N. Y.; ownership, 93
- Schizomycetes; growths of, Baltimore, 214  
 storage, and, 219
- Seattle, Wash.; gratuitous water, 98  
 hydrant revenue, 97  
 main extension financing, 94  
 ownership, purification, rates, 93
- Sedalia, Mo.; financing, 96  
 gratuitous water, 98  
 ownership, 93, 98  
 purification, rates, 93

- Sedimentation; Cedar Rapids, Ia., 104 seq.  
 chlorination, taste and odors, and, 106  
 filtration and, 106  
*see* Purification
- Seneca Falls, N.Y.; gratuitous water, 98  
 ownership, 93, 98  
 purification, rates, 93
- Services; advance placement, 133, 351 seq.  
 cement-lined, 129  
 charges for, 351  
 cost, brass, copper, galvanized iron and lead, 426  
 depth, 352  
 freezing, 393  
 head, loss in, 269  
 pushers, use of, 351  
 sewer pipes, laying in same trench with, 353  
 size, 333, 336 seq.  
 standardization, 132  
 thawing, 393 seq.  
*see* Corrosion; Pipe
- Settling basins, 270  
 cleaning, 131, 238 seq.  
 improvements, alum dosage and, 236 seq.  
*see* Coagulation basins
- Sharon, Pa.; gratuitous water, 98  
 ownership, purification, rates, 93
- Silica; *see* Bacteria, silica-depositing
- Sioux City, O.; ownership, rates, 93
- Soap; waste, hardness and, 107, 400
- Soda ash; cost, 242
- Soda ash treatment; application, chlorometer for, 278  
 coagulation and, 242  
 corrosion and, 241 seq.  
 lead solvency and, 427  
*see* Boiler feed water
- Sodium hypochlorite; chlorination, use for, 277
- solutions, permanence, 277
- Sodium iodide treatment; 271  
 application, chlorometer for, 278  
 chlorination and, 78  
 cost, 70, 74  
 dose required, 73  
 exophthalmic goiter and, 71  
 iodine loss, 79, 81  
 Rochester, 68 seq., 103, 128
- Sodium silicate treatment; corrosion and, 422
- Sodium sulphate; boiler corrosion and foaming and, 290, 293
- Softening; base exchange; 270  
 manganese and, 223
- cost, 403 seq.  
 fuel consumption and, 402
- Illinois and, 107  
 laundry and, 401 seq.  
 lime; 270  
 agitation and, 246  
 alum and, 244  
 iron sulphate and, 244 seq.  
 sand incrustation and, 239, 245  
 settling basins; size, 246  
 sludge removal, 238 seq.
- limits, 108, 403  
 soap waste and, 400 seq.
- South Pittsburgh and, 237 seq.  
*see* Carbonation; Zeolite
- Soil; acidity, 213  
 bacteria, acid production, 213
- Somerville, Mass.; ownership, purification, 93
- South Bend, Ind.; gratuitous water, ownership, 99
- South Manchester, Conn.; fire protection revenue, 335
- South Pittsburgh; *see* American Water and Electric Co.
- Specifications, 269
- Spillway, 269
- Spokane, Wash.; gratuitous water, 98  
 fire protection revenue, 97  
 ownership, rates, 93
- Springfield, Ill.; main extension financing, 95
- Springfield, Mass.; copper sulphate treatment, 310  
 ownership, purification, rates, 93
- Sprinkler systems; charges, 331 seq.  
 flow required, 165  
 regulations, 331 seq.  
 services; size, 333  
 use for purposes other than fire, 333 seq.  
*see* Fire protection, private
- Staining; manganese and, 211 seq.
- Standardization; 61 seq.
- Standpipe; *see* Water tower
- Staunton, Va.; pipeline; water supply, 42
- Staurastrum; storage and, 211
- Steel; corrosion, 419 seq., 421  
 galvanized, durability, 417 seq.  
*see* Pipe, steel
- Steel industry waste; phenols, 414
- Sterilization; *see* Chlorination; Iodine treatment; Ozonization; Ultra violet ray treatment
- Stirling; boiler installations, 301 seq.  
 gasoline standby engine, 301 seq.
- Stoker; *see* Boiler
- Storage; 269  
 bacterial content and, 120, 208

- chlorination and, 122  
coagulation and, 122, 207  
color and, 118  
filtration and, 209  
microscopic content and, 120, 208 seq.  
taste and odor and, 120 seq.  
temperature and, 207  
turbidity and, 116 seq., 207
- Streams; 269 seq.  
classification re pollution, in Pennsylvania, 410 seq.  
interstate; flow regulation, 297 seq.  
water supplies from, 128, 269, 297
- Streator, Ill.; gratuitous water, 99  
ownership, purification, rates, 93
- Superior, Wis.; ownership, purification, rates, 93
- Sulphuric acid treatment; application, chlorometer for, 278
- Surveying instruments; development and manufacture, 129
- Swimming pools; chlorination, chlorometer for, 278  
microscopic organisms; green-producing, 249  
red-producing, 248 seq.
- Switzerland; goiter; dolomite and, 86  
iodine and, 73 seq., 79 seq., 82
- Synura; taste, copper sulphate treatment and, 307
- Tacoma Wash.; financing, 97  
main extension financing, 94  
ownership, purification, rates, 93
- Tampa Fla.; gratuitous water, 99  
ownership, rates, 93
- Taste and odor; alum and chlorine treatment and, 120 seq.  
copper sulphate treatment and, 71, 307 seq.
- Dinobryon and, 307 seq.  
fishy, 71
- Synura and, 120 seq., 307 seq.  
wastes and, law re, 411  
*see Chlorination*
- Taunton, Mass.; ownership, rates, 93
- Taxation; 270
- Temperature; coagulation and, 121  
corrosion and, 420 seq.  
storage and, 207
- Terre Haute, Ind.; gratuitous water, ownership, 99
- Texas Water Works Association; 130
- Tidewater, Va.; services, 353
- Tiffin, O.; gratuitous water, 99  
ownership, purification, rates, 93
- Toledo, O.; ownership, purification, rates, 93
- Topeka, Kans.; hydrant revenue, 96  
ownership, purification, 93  
softening, 108
- Toronto, Ont.; distribution, system, vibration, 198  
filtration, drifting sand, 241  
fire protection revenue, 96  
gratuitous water, 99  
ownership, 93  
pipe, cast iron, early use, 2  
prechlorination and alum treatment, 239 seq.  
pumps, auxiliary, testing, frequency, 197  
rates, 93
- Trachelomonas; chlorination, resistance to, 248  
in swimming pool, 248 seq.
- Troy, N. Y.; consumption, 347  
forestation, 348 seq.  
metering, 347  
pipe, cast iron, 2, 418  
services, 352
- Tubella; storage and, 211
- Tucson, Ariz.; ownership, rates, 93
- Tulsa, Okla.; pipeline, 16 seq., 43  
water supply, 1
- Tunnels, 269
- Turbidity; coagulation and, 121, 207, 270  
filtration and, 341  
storage and, 116 seq., 207
- Turbine, steam; accessibility, 434  
condenser, water works vs. marine, 431 seq., 436  
corrosion; 428 seq.  
superheated steam and, 430, 433 seq.
- efficiency, 430  
non-condensing, 431  
steam extraction, 434
- Turbine, water; efficiency, 438
- Tuscaloosa, Ala.; meters, 316
- Typhoid; 268  
Michigan, 1900-22, 285 seq.  
water purification and, 101 seq., 285 seq.
- Ultra violet ray treatment, 270
- United States; fire loss, 179, 270  
International Joint Commission and, 269
- United States Cast Iron Pipe and Foundry Co.; 3
- United States Chamber of Commerce; materials, seasonal delivery, 305
- United States Dept. of Agriculture; pipe, tests of, 32 seq.
- United States Dept. of Commerce; Building Code Committee;

- plumbing standardization, 63 seq.  
 typhoid statistics, 102  
 United States Dept. of the Interior, Bureau of Mines; phenol wastes and, 414  
 United States Secretary of Commerce; plumbing report, 269  
 United States Treasury Dept., Public Health Service; phenol wastes, 412 seq., 414  
 water analysis, 284  
 water quality standard; 65 seq., 284, 358 seq., 427  
 water supplies, control of, 130  
 United States War Dept.; Allegheny and Monongahela Rivers, flow regulation, 298  
 University of Lausanne; goiter, study of, 82  
 Uroglene; storage and, 211  
 Valparaiso, Ind.; distribution system, 6  
 Valuation, 270  
 Valves; specifications, 269  
 stem, packing, 296  
*see* Check valves  
 Velocity; corrosion and, 420 seq.  
 Versailles, France; cast iron pipe, early use, 2  
 Vessels; oil pollution and, 415  
 water chlorination on, chlorometer for, 278  
 Victoria, B. C.; gratuitous water, 99  
 hydrant revenue, 96  
 ownership, 93  
 water supply, 1  
 Vincennes, Ind.; gratuitous water, ownership, 99  
 Virginia; water softening, 243 seq.  
 Voges-Proskauer reaction, 133  
 differential value, 200 seq.  
 Vorticella; storage and, 211  
 Waco, Tex.; gratuitous water, 99  
 hydrant revenue, 97  
 ownership, 99  
 rates, 93  
 Walkerville, Ont.; hydrant revenue, 96  
 ownership, purification, rates, 93  
 Walla Walla, Wash.; gratuitous water, 99  
 ownership, purification, rates, 93  
 Wallace and Tiernan Co.; 280  
 chlorination apparatus; chlorine meter, 275  
 chlorometer, 277 seq.  
 maintenance costs, 276  
 pedestal type, 276  
 Waltham, Mass.; gratuitous water, 99  
 ownership, rates, 93  
 Warren, O.; ownership, 93  
 Washington, D. C.; main extension financing, 94  
 Washington, Ind.; gratuitous water, ownership, 99  
 Waste, 269  
 detection, flow tests, 166  
*see* Leakage  
 Water analysis; alumina, total, 439 seq.  
 chlorine, free, o-tolidin, 211  
 oxygen dissolved, 133  
*see* Bacteriological examination  
 Water closet, flushometer; expansion tank and, 312 seq.  
 water hammer, elimination, 313  
 Water districts; 270  
 Water diversion; 269  
 Water gratuitous; data, various cities, 97 seq.  
 Water hammer; prevention; air chamber and, 313  
 in flushometer water closets, 313  
 Water purification; development, 100 seq.  
 Water quality, 268  
 bacteriological; indicator, nitrogen as free ammonia as, 240  
 standard, 65 seq., 284, 358 seq.  
 chemical standard, 427  
 lead, permissible amounts, 423  
 reservoir, large and, 206 seq.  
 Water supply; 268 seq.  
 grading and standards, 64 seq.  
 shortage, 133, 340 seq.  
 Water tower; fire protection and, 170  
 Water works; 268 seq.  
 capacity, provision for future, 342  
 materials and supplies; seasonal delivery, 305  
 testing, 132, 269  
 number in U. S. and Canada, 417  
 ownership, data on, 88 seq.  
 revenue; fire protection and, 335  
 forestation of watersheds and, 350  
 Water Works Manufacturers' Association; annual meeting, 129  
 Waterbury, Conn.; ownership, purification, rates, 93  
 Waterford, N. Y.; ownership, purification, rates, 93  
 Watershed; runoff, forestation and, 350  
 yield, storage required and, 269  
*see* Forestation; Pollution; watershed protection

- Watertown, N. Y.; ownership, purification, rates, 93  
Well; color, unusual, 238  
pumping, 382, 391  
Wellesley, Mass.; gratuitous water, 99  
financing, 97  
ownership, rates, 94  
West Orange, N. J.; gratuitous water, 99  
ownership, 94  
West Virginia; Allegheny and Monongahela Rivers, flow regulation, 298  
chlorination, phenols and, 413  
goiter, prevalence, 77  
West Virginia State Dept. of Health; goiter, 77  
Weston's flow tables; correction for age, agreement with practice, 47  
Wilkinsburg, Pa.; gratuitous water, 99  
ownership, rates, 94  
Williamsport, Pa.; gratuitous water, 99  
ownership, purification, rates, 94  
Wilmington, Del.; ownership, 94  
pipe, steel, 4, 58  
purification, rates, 94  
Wilmington, N. C.; hydrant revenue, 97  
ownership, purification, rates, 94  
Windsor, Ont.; distribution system, vibration, 198  
Winnipeg, Man.; gratuitous water, 99  
hydrant revenue, 96  
ownership, rates, 94  
water supply, 1  
Winthrop, Mass.; gratuitous water, 99  
hydrant maintenance revenue, 97  
ownership, purification, rates, 94  
Worcester, Mass.; ownership, rates, 94  
A. Wyckoff and Son Co.; wood-stave pipe, 30  
Xenia, O.; main extension financing, 95  
Yakima, Wash.; ownership, purification, rates, 94  
Yonkers, N. Y.; ownership, purification, rates, 94  
York, Pa.; ownership, purification, rates, 94  
Youngstown, O.; ownership, purification, rates, 94  
Zeolite; history, 134  
properties, 134  
*see* Softening

## AUTHOR INDEX AND NAME REFERENCE

- ABBOTT, C. E., 316  
 ADAMS, L. F., 437  
 ADAMSON, 183  
 ALLEN, C. P., 5  
 ALVORD, J. W., 270  
 APPLEBAUM, S. B., 134, 228, 233  
 ARMSTRONG, JAS. W., 134 seq.  
     The effect of large reservoir on water supply quality, 206 seq.  
 ATACK, 439  
 AVERY, C. N., 130  
 BAILEY, E. H. S., 224, 232  
 BAKER, M. N., 268  
 BALDWIN, F. O., total alumina in water (modified Atack's method) colorimetric determination, 439 seq.  
 BANKSON, E. E., 344, 346  
 BARBOUR, FRANK A., 129, 228, 233, 268 seq.  
 BARDWELL, R. C., 133, 135  
 BARTOW, EDWARD, 130, 270  
 BATES, C. O., Sedimentation in the purification of water at Cedar Rapids, Ia., 104 seq.  
 BAUMANN, 75 seq.  
 BAYLIS, JOHN R., 132 seq., 270, 405, 409  
     manganese in Baltimore water supply, 211 seq.  
 BECK, FREDERICK E., 129 seq.  
 BEHRMAN, A. S., 134, 294  
 BERRY, F. R., 270  
 BEYTHIEN, A., 224, 233  
 BIGGS, GEO. W., JR., 430  
 BIRDSALL, LEWIS I., 133  
 BISER, D. BENTON, 186 seq.  
 BLOMQVIST, H. F., 105  
 BOOTH, GEO. W., 129, 184, 270  
     Methods of making flow tests and their value to water works engineers, 157 seq.  
 BOWMAN, 318  
 BRIDGERS, J. H., 131  
 BROWN, C. D., 130, 196  
 BROWNE, ARTHUR L., 224  
     See PENNIMAN AND BROWNE  
 BRUSH, WM. W., 49 seq., 51, 57, 85 seq., 127 seq., 269  
 BUCK, WM. H., 133, 317 seq., 320 seq., 339  
 BULKELEY, OSCAR E., 133, 342  
 BUNKER, G. C., 426 seq.  
 BURDICK, CHAS. B., 46 seq., 131  
 BURNHAM, HENRY A., 133, 331 seq., 334 seq., 336 seq., 355 seq.  
 BUSWELL, A. M., 133 seq., 249, 268  
     Municipal water softening in Illinois, 107 seq.  
     See BUSWELL, A. M., AND SHIVE, R. A.  
 BUSWELL, A. M., AND SHIVE, R. A., Bacteriological standards, 358 seq.  
 CHACE, W. C., 197  
 CHASE, E. SHERMAN, Iron removal plant at Griffin, Ga., 246 seq.  
 CHATIN, 76  
 CHESTER, 128  
 CHESTER, JOHN N., 130, seq., 271, 351 seq., 355 seq., 428 seq.  
 CHEZY, 55  
 CHILES, GEO. S., 291  
 CLARK, WM. M., 200, 205  
 CLEVELAND, H. BURDETTE, 134  
 COFFIN, T. DEL., Chromogenic organisms in swimming pools, 248 seq.  
 COHEN, J. X., 78  
 COLE, 346  
 COLLINS, 86  
 CORSON, H. P., 224, 228, 232 seq.  
 COURTIOS, 75  
 CRAMER, W. S., 130 seq., 268, 271, 301 seq.  
 CROHURST, H. R., 412 seq.  
 CROTTI, DR., 86  
 CUDDEBACK, ALLAN W., 129  
 CUMMING, HUGH S., 412  
 CUNNINGHAM, F. G., 428 seq.  
 DAILY, C. M., 270  
 DALLYN, F. A., 196 seq.  
 DARLING, 197  
 DAVIS, 128  
 DAY, LEONARD A., 132, 268, 428 seq.  
 DE BERARD, W. W., 268  
 Diven, Jas. M., 127 seq., 305 seq., 312 seq., 316 seq., 322, 338, 340, 342, 344, 346 seq., 348 seq., 352, 353, 354, 355 seq., 417 seq.  
 DIXON, G. G., 269

- DONALDSON, WELLINGTON, 132, 134, 270, 417 seq.
- DUGAN, F. C., 132
- DUGGAN, THOS. R., 133
- DUGGER, EUGENE F., 310
- DUNHAM, H. G., 133
- DYSON, ROBT., 198 seq.
- EDDY, HARRISON P., 270
- EDWARDS, W. R., 269
- EGY, W. L., 129
- ELLMS, J. W., 70, 78 seq., 81, 128 seq., 411 seq.
- EMERSON, C. A., JR., 131, 415
- ENSLOW, LINN H., 133 seq., 271  
Water softening in Virginia by iron sulphate and lime, 243 seq.
- EVERETT, C. M., 390 seq.
- FALES, ALMON L., 131 seq., 269, 415 seq.
- FALK, GEO. K., 229, 233
- FANNING, J. T., 5
- VON FELLENBERG, 74
- FENKELL, G. H., 271
- FIELD, F. E., 270
- FILBY, E. L., 310, 340
- FLINN, A. D., 132
- FOOTE, H. B., 133, 328 seq., 334 seq.
- FORTENBAUGH, J. WARREN, 131
- FRED, N. B., 213, 232
- FREEBURN, H. M., 340 seq.
- FREEMAN, ALLEN W., 130
- FREEMAN, JOHN R., 158
- FRENCH, D. W., 340
- FROST, W. H., 268
- FULLER, GEO. W., 41 seq., 127 seq., 179, 268, 270 seq., Development of water purification, 100 seq.
- FULLER, WESTON, 269
- GELSTON, W. R., 134  
Oil and tastes in chlorinated water, 233 seq.
- GENSHEIMER, G. C., 130
- GIBSON, Jas. E., 52 seq., 130 seq., 302 seq., 305 seq., 310 seq., 313 seq., 319, 324 seq., 326 seq., 328 seq., 333, 339, 343, 344, 346, 348, 351 seq., 436
- GIDLEY, H. T., 133, 329
- GISSLER, E. A., 224, 233
- GLACE, I. M., 131
- GOLDSMITH, CLARENCE, 120, 184, 189, 270  
The relation of fire protection requirements to the distribution system of small towns, 168 seq.
- GOLER, GEO. W., 69, 74 seq.
- GOODELL, JOHN M., 128, 134  
*See McINNES, F. M., AND GOODELL, J. M.*
- GORE, WM., 48 seq., 86, 130 seq., 195, 198, 269
- GORMAN, A. E., 83 seq.
- GRAF, A. V., 134
- GREEN, FRANK W., 132, 134  
Caustic soda and soda ash solutions for filter sand wash, 235 seq.
- GREGORY, J. H., 271
- GWINN, Dow R., 312
- HALE, FRANK E., 83, 85 seq., 130, 270 seq.
- HALL, R. D., 132, 436 seq.
- HANNAN, FRANK, 229, 232 seq., 271, 344
- HANSEN, PAUL, 133 seq.
- HARDER, E. C., 213 seq.
- HATFIELD, WM. D., 294
- HAWLEY, JOHN B., 214, 232
- HAZEN, ALLEN, 32 seq., 72, 269 seq.
- HEFFERNAN, DAVID H., 132 seq., 312 seq., 318 seq., 325 seq., 353, 354, 423 seq.
- HEMPEL, H., 224, 233
- HENDERSON, CHAS. R., 134  
Reconstructed settling basin improves efficiency, 236 seq.
- HENSHAW, FRANKLIN, 133, 330
- HERSHEL, CLEMENS, 127
- HIGHLAND, SCOTLAND G., 77 seq., 128
- HILL, NICHOLAS S., JR., 43 seq., 75, 128 seq., 239, 270
- HINMAN, JACK J., JR., 79 seq., 81, 128 seq.
- HOLMQUIST, C. A., 131, 269
- HOOPES, EDGAR M., 130
- HOOVER, CHAS. P., 134 seq., 270  
Some recent advances in purification auxiliaries, 237 seq.
- HOOVER, Secretary, 63
- HOPKINS, EDWARD S., 405 seq.
- HOUSTON, SIR ALEXANDER C., 271
- HOWARD, NORMAN J., 85, 130 seq.  
Prechlorination at Toronto, 239 seq.
- HOWLAND, J. H., 129, 186
- HUNTER, H. G., 128 seq.
- HURLBERT, W. W., 130
- HUY, HARRY F., 127, 198
- HYDE, CHAS. GILMAN, 238
- JACKSON, D. D., 224, 232
- JENSEN, J. ARTHUR, 127, 130
- JOHNSON, B. R., 200, 205
- JOHNSON, GEO. A., 270
- JOHNSTONE, ALAN, 129

- JORDAN, FRANK C., 127, 132, 179, 184, 269  
 Water works information, 87 seq.  
 JORDAN, H. E., 130 seq.
- KEELER, H. E., 127, 130  
 KELLNER, 198  
 KENDALL, THEODORE R., 132  
 KENDLER, 213, 232  
 KERR, 132, 433  
 KIRKWOOD, JAS. P., 100  
 KNIGHT, RAY, 196  
 KNOWLES, C. R., 133  
 KNOWLES, MORRIS, 128  
     Allocation of water supplies derived from the water sheds of interstate streams, 297 seq.  
 KOSER, STEWART A., A new differential test for members of the colo-n group of bacteria, 200 seq.  
 KRAFT, L., 224, 233
- LANGMUIR, I., 229, 233  
 LEA, W. S., Relative economy of standby oil engines, 191 seq.  
 LEISEN, THEODORE A., 3, 57 seq., 131  
 LEVINE, MAX, 84, 133, 205  
 LITTLE, BEEKMAN C., 128  
     Sodium iodide treatment of Rochester's water supply, 68 seq.  
 VAN LOAN, SETH M., 128, 134, 268, 270  
 LÖHNIS, F., 213, 232  
 LUBS, H. A., 200, 205  
 LUSCOMBE, WM., 129, 189 seq.
- MACKENZIE, S. H., 309, 335  
 MCCLENDON, J. F., 71, 73, seq.  
 MCCLINTOCK, 270  
 McCRADY, M., 133  
 MCINNES, F. A., *see* MCINNES, F. A., AND GOODELL, J. M.  
 MCINNES, F. A., AND GOODELL, J. M., Current practice in thawing frozen services and hydrants, 393 seq.  
 McLAUGHLIN, A. J., 130, 268  
 MABBS, JOHN W., 294  
     Packing, 295 seq.  
 MAHLIE, W. S., 214, 232  
 MAILLARD, ALBERT L., 428 seq.  
 MAIN, CHAS. T., 269  
 MANGUN, L. B., 130  
 MARK, COLEMAN B., 131  
 MARSHALL, CHAS. E., 232  
 MATTER, L. D., 131  
 MAURY, DABNEY H., 131, 269  
     Large supply mains, 1 seq.  
 MERRIMAN, THADDEUS, 131 seq., 269  
 MESSEY, R., 269  
 METCALF, LEONARD, 269 seq.
- MEYER, 349 seq.  
 MILLER, LEWIS B., 134, 405 seq.  
 MILLS, H. F., 101  
 MILNE, ALEX., 130  
 MILNE, JAS., 198  
 MINOR, EDWARD E., 128, 278 seq.  
 MITCHELL, 183  
 MONGER, JOHN E., 413 seq.  
 MOODY, G. T., 213, 232  
 MOORE, CHAS. E., 303  
 MOORE, F. F., 55  
 MOORE, L. E., 133, 323 seq.  
 MORRIS, *see* MORRIS, TASKER AND MORRIS  
 MORRIS, S. B., 3  
 MORRIS, TASKER AND MORRIS, 3  
 MORRISON, 427  
 MORSE, ROBT. B., 270  
 MORTENSON, PROF., 106  
 MOSELY, S. L., 132, 313 seq.  
 MOSES, H. E., 131, 269  
 MURDOCK, 3
- NEWSOM, R. J., 129
- O'BRIEN, D. F., 270  
 O'BRIEN, DENNIS, 130  
 OSBORN, 3
- PARTRIDGE, E. M., The chemistry of interior boiler water treatment, 288 seq.  
 PASTEUR, 71  
 PENNIMAN, *see* PENNIMAN AND BROWNE  
 PENNIMAN AND BROWNE, 224  
 PETERSON, A., 437  
 PIRNIE, MALCOLM, 134, 268, 270  
 PLUMMER, DR., 71  
 POWELL, S. T., 130, 268, 270
- RANDLETT, F. M., 130, 269  
 VON RAUMER, E., 224, 232  
 REAGAN, JOHN F., 129  
 REQUARDT, GUSTAV J., 54, 131  
 RICH, EDWARD D., Supervision of water treatment plants in Michigan, 282 seq.  
 RITCHIE, E. G., 44 seq., 131  
 ROGERS, L. A., 200, 205  
 RUDOLFS, WM., 133  
 RUSSELL, JAS., 3  
 RUTHRAUFF, E. E., *see* STANLEY, WM. E., AND RUTHRAUFF, E. E.
- SALE, J. W., 224, 232  
 SANDERSON, A. U., 197  
 SAVILLE, CHAS. M., 280 seq.  
 SAVILLE, THORNDIKE, 269  
 SAWIN, LUTHER R., 248

- SCHNEIDER, WM. G., 425  
SCOBY, F. C., 32 seq.  
SEDGEWICK, DR., 84  
SHERWOOD, WM. C., 132  
SHIVE, R. A., *see* BUSWELL, A. M.,  
AND SHIVE, R. A.  
SIEBERT, CHRISTIAN L., 131  
SIEMS, V. BERNARD, 129 seq., 186  
seq., 189, 269  
SMITH, J. WALDO, 128, 270  
SMITH, L. A., 268  
SELLER, F. N., 132, 419 seq.  
SPENCER, C. A., 133  
SPENCER, H. M., 129  
SPROLES, A. J., 310  
STANLEY, WM. E., *see* STANLEY, WM.  
E., AND RUTHRAUFF, E. E.  
STANLEY, WM. E., AND RUTHRAUFF,  
E. E., Effect of the new impounding  
reservoir on filter plant operation  
at Decatur, 110 seq.  
STARR, R. H., 199  
STEROSKY, JOSEPH, 306, 320, 323, 338,  
351, 354  
STEVENSON, W. L., 131, 410 seq.  
STOCKLMEIR, LOUIS, 129  
STREETER, H. W., 134, 270  
STROUT, GALE S., Softening of public  
water supplies, 398 seq.
- TASKER, *see* MORRIS, TASKER AND  
MORRIS  
TAYLOR, GEO. R., 132, 249, 305, 306  
seq.  
TAYLOR, STEPHEN H., 129 seq., 321  
seq.  
TIERNAN, M. F., 129  
The chlorination of small water  
supplies, 272 seq.  
TISDALE, E. S., 131, 412 seq.  
TOLMAN, MAYO, 75, 128  
TOYNE, JOHN W., 130  
TROWBRIDGE, 237
- VALENTINO, JOHN G., 133, 329 seq.,  
333 seq., 338, 351 seq.
- VAN, prefix VAN neglected for index-  
ing purposes  
VEATCH, T. N., JR., 108  
VOLLMAR, 224, 233  
VON, prefix VON neglected for index-  
ing purposes  
VOSBURY, W. DEWITT, 132, 428 seq.  
Operating experiences and econ-  
omy of a Diesel engine driven  
pumping station, 381 seq.
- WALKER, ISAAC S., 269, 434  
WALKER, WM. H., 419  
WALL, EDWARD E., 268, 270  
WALTERS, R. 198  
WALWORTH, JAS. J., 3  
WARING, F. H., 133 seq.  
WEIR, W. V., 327  
WELTER, ROY, 238  
WENTWORTH, FRANKLIN H., 129  
The economic significance of fire  
waste, 179 seq.  
WESTON, 47  
WESTON, ROBT. SPURR, 131 seq., 224,  
228, 232, 241, 422 seq.  
WHERRY, EDGAR T., 291  
WHIPPLE, GEO. C., 82 seq., 128 seq.,  
269 seq.  
Government requirements and pro-  
fessional standards, 61 seq.  
WHIPPLE, MELVILLE C., 133 seq.  
Soda ash for preventing corrosion  
at Cambridge, Mass., 241 seq.  
WHITEHOUSE, CORNELIUS, 3  
WIGGIN, THOMAS H., 54 seq., 132, 269  
WILCOX, WM. F., 418  
WILLIAMS, 32 seq.  
WILLIAMSON, F. S., 408 seq.  
WILLSON, WM. J., 318, 321  
WILSON, NORMAN R., 196 seq.  
WILSON, R. E., 420  
WILSON, RODNEY C., 133  
WOLMAN, ABEL, 129 seq., 268 seq.  
WOOD, LEONARD P., 50 seq., 54 seq.,  
57, 128 seq., 269, 297  
WYCKOFF, A., 5, 30
- YODER, L. M., 134

## INDEX TO ABSTRACTS

### I. AUTHORS

- A. B., 451  
ABBOTT, W. E., *see* BECKER, H. G.,  
and ABBOTT, W. E.  
ACHATZ, R. V., *see* ANDEREgg, F. O.,  
and ACHATZ, R. V.  
ADAMS, G. C., 252.  
ALEXANDER, B., 250  
ALEXANDRE, 448.  
ALTIERI, V. J., *see* WHITMAN, W. G.,  
RUSSELL, R. P., and ALTIERI,  
V. J.  
ALWAY, F. J., 144  
American City, 148, 149, 257, 366  
American Gas Association, 369  
American Railway Engineering Association, 140, 372, 373, 457  
American Society of Civil Engineers, 465  
ANDEREgg, F. O., *see* ANDEREgg,  
F. O., and ACHATZ, R. V.  
ANDEREgg, F. O., and ACHATZ, R. V., 464  
ANDREWS, E., 363  
ANDRiska, V., *see* FREUND, J., and  
ANDRiska, V.  
ANGUS, ROBT. W., 365  
ANNIS, R. K., 361  
ARONOVICH, CAROL, 366  
D'ARSONVAL, *see* D'ARSONVAL, BORDAS, F., and TOUPLAIN  
D'ARSONVAL, BORDAS, F., and TOUP-  
LAIN, 449  
BACH, *see* BACH and SIERP  
BACH and SIERP, 146  
BACHMANN, FRANK, *see* BACHMANN,  
F., and BESELIEVRE, E. B.  
BACHMANN, F., and BESELIEVRE,  
E. B., 465  
BADGER, E. F., 151  
BADO, A. A., *see* BADO, A. A., and  
TRELLES, R. A.  
BADO, A. A., and TRELLES, R. A., 142  
BAHLMANN, CLARENCE, 443  
BAK, A. K., 452  
BALCKE, MASCHINENBAU-A.-G., 453  
BANCEL, P., 455  
BANERJI, NAN LAL, 445  
BANKSON, E. E., 261  
BARDWELL, R. C., 371  
BARKER, E. G., 251  
BARR, W. M., 465  
BATCHELDER, GEO. W., 375  
BATES, C. G., 463  
BATES, H. H., 363  
BAUMANN, P. E., 265  
BAYARD, O., 444  
BAYLIS, J. R., 149  
BEARD, J. T. 2nd, 453  
BECK, JOSEPH A., 262  
BECKER, F., 253  
BECKER, H. G., *see* BECKER, H. G.,  
and ABBOTT, W. E.  
BECKER, H. G., and ABBOTT, W. E., 137  
BELYEA, H. C., 463  
BENNING, C. H., 153  
VAN BENSHOTEN, J., 265  
BESSELIEVRE, E. B., *see* BACHMANN,  
F., and BESELIEVRE, E. B.  
VAN BOEKEL, DR., 445  
BORDAS, F., 466  
*see* D'ARSONVAL, BORDAS F., and  
TOUPLAIN; BORDAS, F., and  
TOUPLAIN, F.  
BORDAS, F., and TOUPLAIN, F., 449  
BOWMAN, W. W., 136  
BOWREY, S. E., *see* DUCKHAM, A.,  
and BOWREY, S. E.  
BOYD, F. E., 452  
BOYNE, JOHN J., 369  
BRAMWELL, B., 453  
BREWSTER, B. B., 148  
BRIGGS, B. A., 251, 360  
BROCKWAY, W. C., 149  
BROMLEY, C. H., 452  
BROWN, C. C., 361  
BROWN, RALPH, 251, 360  
BROWNlie, D., 466  
BRUSH, WM. W., 375  
BULLI, M., *see* BULLI, M., and  
FERNANDES, L.  
BULLI, M., and FERNANDES, L., 451  
BUNKER, GEO. C., *see* BUNKER, GEO.  
C., and NOLTE, AUG. C.  
BUNKER, GEO. C., and NOTES,  
AUG. C., 459  
BURGER, B., 446

- BURGESS, PHILIP, 149  
 BUTESCU, D., 254  
 BUTTERFIELD, C. T., 442
- California State Board of Health, 151, 152  
 CAMPION, H. T., 441  
 Canadian Engineer, 264, 365, 463  
 CAPEL, C. H., 152  
 CARMACK, H. E., 260  
 CARTER, H. C., 140  
 CAUVIN, *see* LEVY-SALVADOR and CAUVIN  
 CHACE, W. G., 264  
 CHAPLIN, CLAUDE M., 457  
 CHASE, E. SHERMAN, 150  
 CHATERJEE, K. P., 139  
 CHEINISSE, 444  
 Chemical and Metallurgical Engineering, 259, 363  
 CHESTER, J. N., 259, 261  
 Chicago Dept. of Health, 368  
 CHIPMAN, WILLIS, 463  
 COFFIN, G. S., *see* PIGOTT, R. J. S., and COFFIN, G. S.  
 COLBORN, C. E., 362, 454  
 COLE, A. L., 455  
 COLLEDGE, W. W., 457  
 COLES, GEO. W., 370  
 COLLINS, MICHAEL F., 373  
 COLLINS, W. D., *see* COLLINS, W. D., and FOSTER, M. D.  
 COLLINS, W. D., and FOSTER, M. D., 153  
 Connecticut State Dept. of Health, 151, 152  
 CONZELMAN, J. W., 360  
 Copper and Brass Extended Uses Council, Birmingham, Eng., 466  
 CORCORAN, HARRY J., 458  
 COTTRILL, H. W. B., *see* PETERS, N. J., COTTRILL, H. W. B., and CRIMP, B. S.  
 COULSON, *see* COULSON and FORBES  
 COULSON and FORBES, 466  
 COULTER, WALDO S., 375, 460  
 CRASU, V., 255  
 CRIMP, B. S., *see* PETERS, N. J., COTTRILL, H. W. B., and CRIMP, B. S.  
 CROCKETT, H. S., 379  
 CUNNINGHAM, J., *see* CUNNINGHAM J., and RAGHAVACHARI, T. N. S.  
 CUNNINGHAM, J., and RAGHAVACHARI T. N. S., 263  
 DANIELS, F. H., 253  
 DAVIS, A. C., 466  
 DAVIS, W. R., 379, 460  
 Detroit Department of Health, 368
- DEWEVERE, 250  
 DIEDRICK, P., 378  
 DIENERT, 139, 466  
 DIENERT, F., 445  
*see* DIENERT, F., and WANDEN-BULKE, F.  
 DIENERT, F., and WANDENBULKE, F., 138  
 DIENERT, M. F., 466  
 DIKON, F. J., 379  
 DITTOE, W. H., 443  
 DORISEY, C. E., 362  
 DRUEGER, C. G., 151  
 DUCKHAM, A., *see* DUCKHAM, A., BOWREY, S. E.  
 DUCKHAM, A., and BOWREY, S. E., 361  
 DUFFEY, P. R., 360  
 DURAND, R., 444  
 DUTOIT, P., *see* DUTOIT, P., and GROBET, ED.  
 DUTOIT, P., and GROBET, ED., 142
- EBEL, F., 141  
 EHLLERS, H. E., 261  
 ELEKTRO-OSMOSE, A. G., 147  
 ELLMS, J. W., 257, 443  
 ENDRISS, J. O., 366  
 Engineering, 379  
 Engineering and Contracting, 377, 378, 379, 462  
 ERICSON, JOHN, 377  
 ESTEY, R. W., 378  
 EVANS, F. C., 360
- FALK, I. S., *see* WINSLOW, C. E. A., and FALK, I. S.  
 FELTON, L. D., 368  
 FERGUSON, G. H., 365  
 FERGUSON, HARRY F., 152  
 FERNANDES, L., *see* BULLI, M., and FERNANDES, L.  
 FETLE, A. A., 252  
 Fire and Water Engineering, 459, 461  
 FITZGERALD, W. V., 362  
 FORBES, *see* COULSON and FORBES  
 FOSTER, E. M., 148  
 FOSTER, MARGARET D., *see* COLLINS, W. D., and FOSTER, M. D.  
 FOULK, C. W., 442  
 FOWLER, GILBERT J., 370  
 FOX, E. J., *see* FOX, E. J., and WILSON, P. H.  
 FOX, E. J., and WILSON, P. H., 466  
 FOX, J. J., *see* FOX, J. J., and GAUGE, A. J. H.  
 FOX, J. J., and GAUGE, A. J. H., 141  
 FRANKFORTER, C. J., *see* FRANKFORTER, C. J., and JENSEN, F. W.

- FRANKFORTER, C. J., and JENSEN, F. W., 154  
 FREDERICK, R. C., 146  
 FRENCH, H. J., 142  
 FREUND, J., *see* FREUND, J., and ANDRISKA, V.  
 FREUND, J., and ANDRISKA, V., 444  
 FREY, EDWARD, F., 458  
 FULDA, ERNST, 449  
 FULLER, C. H. R., 370  
 FULLER, GEO. W., 263, 459  
*see* SMITH, J. W., HAZEN, ALLEN,  
 FULLER, G. W., and HASSKARL,  
 J. F.  
 FULLER, HARRY U., 376  
 FURMAN, R. W., 441
- GAGE, STEPHEN DEM., *see* GAGE,  
 S. DEM., and McGOULDRECK,  
 P. C.  
 GAGE, S. DEM., and McGOULDRECK,  
 P. C., 370  
 GAMBLE, S. E., 378  
 GARDNER, HENRY A., 447  
 GASPERINI, G., *see* TARUGI, N., and  
 GASPERINI G.  
 GAUGE, A. J. H., *see* FOX, J. J.,  
 and GAUGE, A. J. H.  
 GAUSS, H. F., 455  
 GAVETT, J. W., JR., 362  
 GEARE, H. W., 252  
 GEIGER, CHAS. W., 374  
 GERMER, 254  
 GIBBONS, JAS. O. G., *see* MATT,  
 H. P., and GIBBONS, J. O. G.  
 GILL, AUGUSTUS H., 154  
 GOODRICH, W. F., 466.  
 GOSHORN, ROY W., 143  
 GOURLAY, H. J. F., 250  
 GOW, C. R., 462  
 DE GRAAF, G. A., 252  
 DE GRAAF, W. C., 254  
 GRAYSON, THEODORE J., 260  
 GROBET, EDOURD, 254  
*see* DUTOIT, P., and GROBET, ED.  
 GRÜN, R., 141  
 GRYLLS, *see* SMITH, HINCHMAN and  
 GRYLLS  
 GUILLERD, A., 466  
 GUILLET, LEON, 137  
 GUNN, T. M., 362  
 GWAN, ALBERT, 378
- HAARMAN, 253  
 HARRISON, A. P., *see* SCALES, F. M.,  
 and HARRISON, A. P.  
 HARTMANN, O. H., 143  
 HASLAM, R. T., 253
- HASSKARL, J. F., *see* SMITH, J. W.,  
 HAZEN, ALLEN, FULLER, G. W.,  
 and HASSKARL, J. F.  
 HATHAWAY, JOS. C., *see* McCLENDON,  
 J. F., and HATHAWAY, J. C.  
 HAWLEY, RALPH C., 463  
 HAYHURST, E. R., 443  
 HAZEN, ALLEN, *see* SMITH, J. W.,  
 HAZEN, ALLEN, FULLER, G. W.,  
 and HASSKARL, J. F.  
 HELLSTROM, B., 377  
 HERZOG, ROBT., 456  
 HEWITT, H. C., 378  
 HILDITCH, T. P., *see* HILDITCH, T. P.,  
 and WHEATON, H. J.  
 HILDITCH, T. P., and WHEATON, H.  
 J., 255  
 HINCHMAN, *see* SMITH, HINCHMAN,  
 and GRYLLS  
 HINMAN, JACK J., JR., 365, 450  
 HIRST, L. F., 370  
 HODGKINSON, F. P., 252  
 HÖGBOM, A. G., 139  
 HOMERBERG, V. O., *see* WILLIAMS,  
 R. S., and HOMERBERG, V. O.  
 HOOPER, THOS. H., 373  
 HOOVER, CHAS. P., 442  
 HORNE, R. W., 148  
 HOWARD, N. J., 366  
 HUGHES, H., 362  
 HUNTER, H. G., 265  
 HURST, H. E., *see* HURST, H. E.,  
 and WATT, D. A. F.  
 HURST, H. E., WATT, D. A. F., 462  
 HUSTON, C. L., 455
- IMBEAUX, ED., 446  
 IMHOFF, K., 142
- JACKSON, C. B., 379, 461  
 JACKSON, J. FREDERICK, 140  
 JACOBS, NATHAN B., *see* KNOWLES,  
 MORRIS, and JACOBS, NATHAN  
 B.  
 JARVIS, R. H., *see* JARVIS, R. H.,  
 and LEEKE, D. W.  
 JARVIS, R. H., and LEEKE, D. W.,  
 142  
 JELLISON, L. J., 150  
 JENSEN, FRED W., *see* FRANKFORTER,  
 C. J., JENSEN, FRED W.  
 JOHNSON, GEO. A., 147, 364.  
 JOHNSTONE-TAYLOR, F., 461  
 JONES, J. A., 140, 142  
 Journal Royal Sanitary Institute,  
 371  
 JUNK, *see* MAASS and JUNK  
 JUSTIN-MUELLER, ED., 143

- KANTHACK, F. E., 466  
 KESSLER, L. H., *see* WARD, C. N.,  
 and KESSLER, L. H.  
 KIMBALL, O. P., 151, 443.  
 KING, L. H., 462  
 KISZKALT, KARL, 145  
 KNOWLES, C. R., 372, 457  
 KNOWLES, MORRIS, *see* KNOWLES  
 MORRIS, and JACOBS, NATHAN  
 B.  
 KNOWLES, MORRIS, and JACOBS,  
 NATHAN B., 260  
 KOLTHOFF, I. M., 451  
 KORTHOFF, G., 446  
 KRAUT, HEINRICH, *see* WILSTATTER,  
 R., and KRAUT, H.  
 LABOUR, MARIE, 250  
 LAFRENIERE, THEODORE J., 265, 370  
 LANGELIER, W. F., 451  
 LANGHAM, M. G., 251  
 LASSEN, S. V. H., *see* LASSEN, S. V.  
 H., and United Water Softeners,  
 Ltd.  
 LASSEN, S. V. H., and United Water  
 Softeners, Ltd., 454  
 LAUDAHN, W., 362  
 LAUDELIN, W., 452  
 LEDOUX, J. W., 261  
 LEEKE, D. W., *see* JARVIS, R. H.,  
 and LEEKE, D. W.  
 LEHMAN, P., *see* LEHMAN, P., and  
 REUSS, A.  
 LEHMAN, P., and REUSS, A., 444  
 LESUR, LEON, 155  
 LEVINE, MAX, 145  
 LEVY, A. HOYT, 252  
 LEVY-SALVADOR, *see* LEVY-SALVADOR  
 and CAUVIN  
 LEVY-SALVADOR and CAUVIN, 155  
 LOCKHART, G. L., 250  
 LONG, L., 360  
 LONGLEY, F. F., 369  
 LOTZ, E. H., 152  
 LOVELL, A. P., 460  
 LUCE, FRANCIS H., 374  
 LUDWIG, R. E., 256  
 LUSCOMBE, WM., 462  
 MAASS, *see* MAASS and JUNK  
 MAASS and JUNK, 446  
 MACDONALD, W. E., 364  
 MACGREGOR, JOHN, 141  
 MacLachlan Reduction Process Com-  
 pany, Inc., 146  
 MACLOED, D. J., *see* REED, G., and  
 MACLOED, D. J.  
 MARCHAND, HENRI, 138  
 MARSTON, FRANK A., 375  
 MARTIN, J., 379  
 MARTINDALE, E. H., 361  
 Maryland State Department of  
 Health, 369  
 MASTERS, HELEN, *see* TINKLER, C.  
 K., and MASTERS, H.  
 MATTE, HUBERT P., *see* MATTE, H.  
 P., and GIBBONS, J. O. G.  
 MATTE, H. P., and GIBBONS, J. O.  
 G., 461  
 MAURY, DABNEY H., 377  
 MAXWELL, W. H., 139  
 MAYER, E., *see* MAYER, E., and  
 SCHON, R.  
 MAYER, E., and SCHON, R., 456  
 MAYNZ, T., 252  
 MAZZUR, FRANK A., 460  
 McCLENDON, J. F., *see* McCLENDON,  
 J. F., and HATHAWAY, J. C.  
 McCLENDON, J. F., and HATHAWAY,  
 J. C., 371  
 McGOULDICK, PHILIP C., *see* GAGE,  
 S. DEM., and McGOULDICK, P. C.  
 McGrath, R. P., 379  
 McHAFFIE, I. R., *see* SHIPLEY, J. W.,  
 and McHAFFIE, I. R.  
 McMULLIN, A. R., 363  
 MELROSE, R. C., 455  
 MERRILL, F. E., 463  
 MESSER, RICHARD, 153, 380  
 Miami Conservancy District, 462  
 Michigan Department of Health, 151  
 MILLER, L. B., 448  
 MITCHELL, GEO., 250  
 MITCHELL, LOUIS, 379  
 MOAT, C. P., 377  
 MOIR, JAS., 450  
 MOLLIEX, P., 155  
 MOORE, H., 141  
 MORGAN, J. D., 455  
 MUDD, STUART, *see* WARREN, S.,  
 and MUDD, S.  
 MUHFELD, J. E., 253  
 MUNDLEIN, A., 456  
 MUNSON, EDGAR, 262  
 NELSON, FRED B., 257  
 NEUBLING, EDWARD, 258  
 New York State Department of  
 Health, 153  
 NITZCHE, H., 141  
 NOLTE, AUG. G., *see* BUNKER, G. C.,  
 and NOLTE, A. C.  
 Ohio Conference, 441  
 OLSEN, E. H., 372  
 OLSZEWSKI, W., 445  
 DEONG, E. R., 143  
 Pasadena, Cal., Water Department,  
 462

- PELLING, A. J., 450  
 PETERS, N. J., *see* PETERS, N. J.  
 COTTRILL, H. W. B., and CRIMP, B. S.  
 PETERS, N. J., COTTRILL, H. W. B., and CRIMP, B. S., 450  
 PICKWORTH, A., 142  
 PIGOTT, R. J. S., *see* PIGOTT, R. J. S., and COFFIN, G. S.  
 PIGOTT, R. J. S., and COFFIN, G. S., 251  
 POLLITT, ALLAN A., 446  
 Power, 136, 252, 360, 361, 362, 363, 452, 453, 454, 455  
 PRESCOTT, S. C., *see* PRESCOTT, S. C., and WINSLOW, C. E. A.  
 PRESCOTT, S. C., and WINSLOW, C. E. A., 466  
 Public Health Reports, 137  
 Public Works, 378, 379  
 RACE, JOS., 140  
 RAGHAVACHARI, T. N. S., *see* CUNNINGHAM, J., and RAGHAVACHARI, T. N. S.  
 Railway Engineering and Maintenance, 371, 372, 456  
 Railway Review, 373  
 RAJU, V. GOBINDA, 263  
*see* STEWART, A. D., and RAJU, V. GOBINDA  
 RAKUZIN, M. A., 450  
 REDDIE, J. A., 449  
 REED, G., *see* REED, G., and MACLOED, D. J.  
 REED, G., and MACLOED, D. J., 368  
 REUSS, A., *see* LEHMAN, P., and REUSS, A.  
 RICHARDSON, J. S. S., 260  
 ROBERTSON, R. N., 360  
 RODIO, GIOVANNI, 380  
 ROE, A. C., 362  
 ROGERS, R. H., 363  
 RUGGLES, SYDNEY L., 458  
 RUSSELL, R. P., *see* WHITMAN, W. G., and RUSSELL, R. P.; WHITMAN, W. G., RUSSELL, R. P., and ALTIERI, V. J.  
 SAKLATWALLA, B. D., 364  
 SARMIENTO, A., 250  
 SAVAGE, WM. G., *see* SAVAGE, WM. G., and WOOD, D. R.  
 SAVAGE, WM. G., and WOOD, D. R., 254  
 SAVILLE, CALEB MILLS, 374  
 SCALES, F. M., *see* SCALES, F. M., and HARRISON, A. P.  
 SCALES, F. M., and HARRISON, A. P., 258  
 SCHEFFLER, F. A., 253  
 SCHERINGA, K., 145  
 SCHON, R., *see* MAYER, E., and SCHON, R.  
 SCHRECK, H., 251  
 SCOTT, JAS., 144  
 SHARPE, C. D., 378  
 SHEEHAN, F. E., 442  
 SHERMAN, EDWARD C., 368  
 SHIPLEY, J. W., *see* SHIPLEY, J. W., and McHAFFIE, I. R.  
 SHIPLEY, J. W., and McHAFFIE, I. R., 258, 447  
 SIERP, *see* BACH and SIERP  
 SILBERSCHMIDT, W., 444  
 SIMPSON, STEPHEN G., 367  
 SMITH, *see* SMITH, HINCHMAN, and GRYLLS  
 SMITH, HINCHMAN, and GRYLLS, 363  
 SMITH, A. B., 140  
 SMITH, H. L., 455  
 SMITH, J. W., *see* SMITH, J. W., HAZEN, ALLEN, FULLER, G. W., and HASSKARL, J. F.  
 SMITH, J. W., HAZEN, ALLEN, FULLER, G. W., and HASSKARL, J. F., 463  
 SMITH, L. B., *see* SMITH, L. B., and TAYLOR, R. S.  
 SMITH, L. B., and TAYLOR, R. S., 448  
 SOHLBERG, ERIK G., 154  
 SORLEY, JAS., *see* THOMPSON, R. T., and SORLEY, J.  
 DE SORNAY, P., 140  
 SPELLER, FRANK N., 263  
 SPENCE, G. K., 143  
 SPENCER, D. C., 457  
 Springfield, Mass., Water Commission, 371  
 STEVENSON, W. L., 259  
 STEWART, A. D., *see* STEWART, A. D., and RAJU V. GOBINDA  
 STEWART, A. D., and RAJU, V. GOBINDA, 263  
 STORRIE, WM., 364  
 STRADLING, R. E., 144  
 STREET, A. L. H., 257  
 STREETER, H. W., 442  
 Surveyor, 371  
 TARUGI, N., *see* TARUGI, N., and GASPERINI, G.  
 TARUGI, N., and GASPERINI, G., 453  
 TAYLOR, JOHN, 462  
 TAYLOR, R. S., *see* SMITH, L. B., and TAYLOR, R. S.  
 TAYLOR, STEPHEN H., 378  
 TENNEY, E. H., 452  
 THOMPSON, R. T., *see* THOMPSON, R. T., and SORLEY, J.

- THOMPSON, R. T., and SORLEY, J., 137  
THORESEN, HALLGRIM, 264  
TINKLER, C. KENNETH, *see* TINKLER, C. K., and MASTERS, H.  
TINKLER, C. K., and MASTERS, H., 138  
TITCOMB, G. E., 453  
TITOV, W. S., 253  
TODD, V. H., 251  
TOUPLAIN, F., *see* D'ARSONVAL, BORDAS F., and TOUPLAIN *see* BORDAS, F., and TOUPLAIN, F.  
TOWL, ROY M., 377  
TRELLES, R. A., *see* BADO, A. A., and TRELLES, R. A.  
  
United Water Softeners, Ltd., *see* LESSEN, S. V. H., and United Water Softeners, Ltd.  
  
VAN, prefix VAN neglected for indexing purposes  
VERNON, W. H. J., 452  
VIGNERON, H., 155  
VOORHIS, W. R., 260  
  
WALKER, ISAAC S., 261  
WALKER, STANTON, 141  
WANDENBULKE, F., *see* DIENERT, F., and WANDENBULKE, F.  
WARD, C. N., *see* WARD, C. N., and KESSLER, L. H.  
WARD, C. N., and KESSLER, L. H., 463  
WARING, F. H., 151  
WARREN, SHIELDS, *see* WARREN, S., MUDD, S.  
WARREN, S., and MUDD, S., 368  
Water and Water Engineering, 139, 444  
WATT, D. A. F., *see* HURST, H. E., and WATT, D. A. F.  
  
WEIR, JAS., 139  
WEISENBERG, G., 144  
WELLS, PHILIP P., 262  
WETMORE, H. C., 373  
WHEATON, H. J., *see* HILDITCH, T. P., WHEATON, H. J.  
WHITMAN, W. G., *see* WHITMAN, W. G., and RUSSELL, R. P.; WHITMAN, W. G., RUSSELL, R. P., and ALTIERI, V. J.  
WHITMAN, W. G., and RUSSELL, R. P., 364  
WHITMAN, W. G., RUSSELL, R. P., and ALTIERI, V. J., 367  
WHITTEMORE, F. E., 366  
WILHELMI, J., 446  
WILLARD, ERNEST C., 376  
WILLIAMS, G. M., 264  
WILLIAMS, R. S., *see* WILLIAMS, R. S., and HOMERBERG, V. O.  
WILLIAMS, R. S., and HOMERBERG, V. O., 154, 362  
WILLSTATTER, RICHARD, *see* WILLSTATTER, RICHARD, and KRAUT, HEINRICH  
WILLSTATTER, RICHARD, and KRAUT, HEINRICH, 449  
WILSON, L. F., 373  
WILSON, P. H., *see* FOX, E. J., and WILSON, P. H.  
WINDISCH, RICHARD, 445  
VAN WINKLE, FRANKLIN, 136  
WINSLOW, C. E. A., *see* WINSLOW, C. E. A., and FALK, I. S.; PRESCOTT, S. C., and WINSLOW, C. E. A.  
WINSLOW, C. E. A., and FALK, I. S., 448  
WINSLOW, FREDERIC I., 375  
WOEHLK, J. H., 449  
WOLFE, JOHN K., 369  
WOOD, D. R., *see* SAVAGE, W. G., and WOOD, D. R.  
WOSNESSENSKY, S., 447

## INDEX TO ABSTRACTS

### II. SUBJECTS

- Activated Sludge; creamery waste purification and, 145  
Adsorption; alumina and, 449, 450 coagulation and, 447  
Advertisement; East Bay Water Co. and, 457  
Aération; *see* Water, Aération  
Agitation; precipitates, entrainment by, and, 142 water softening and, 372  
Air, Compressed; *see* Compressor; Pump, Air-Lift  
Air-Lift; *see* Pump, Air-Lift  
Aix-les-Bains; mineral water, analysis, 449  
Algae; *see* Water, Microscopic Organisms  
Algör; boiler feed water treatment, 139  
Alpax; 137  
Alternator; operation without direct current excitation, 137  
Alum; *see* Aluminum Sulfate; Water, Coagulation  
Aluminum; alloy, new, 137 corrosion and, 138 salts of, caustic soda and, reactions, 254  
Aluminum Determination; Blum's method, 448  
Aluminum Hydroxide; adsorption and, 449, 450 precipitated, purity of, 254  
Aluminum Sulfate; analysis, 144, 253  
American Association for Promoting Hygiene and Public Baths; swimming pool construction standards, 369  
American Concrete Institute; concrete specifications, 465  
American Public Health Association; water supply and purification, 459  
American Railway Bridge and Building Association; stock yard water supplies, 456  
American Railway Engineering Association; concrete specifications, 465 water analysis and, 372  
American Society of Civil Engineers; concrete specifications, 465  
American Society for Testing Materials; concrete specifications, 465  
American Water Works Association; Canadian Section meeting, 365  
Amoeba; chlorination and, 446  
Anabaena; India and, 263 Rockport, Mass. and, 150  
Aquaphone; leakage detection and, 257  
Aqueduct; cleaning, 375 flow, seasonal variation, 462  
Arizona; water consumption and, 461  
Army; water supply and, 250, 446 Ashland Water Co.; impure water and disease, liability for, 257  
Asterionella; Rockport, Mass., and 150  
Auburndale, Fla.; well water system, 378  
Australia; pollution and, 369  
Automobile; operating costs, 462  
Babbitt; bearings and, 363 linings of, renewing, 252  
Bacteria; alkalinity production by, 449 capillary spaces, penetration, 368 H-ion concentration, growth and motility and, 368 motile, separation of, 368  
Bacteriological Media; H-ion concentration and, 442  
Bacteriology; *see* Books, New  
Bacterium Coli; filtration and, limiting concentration, 442 glucose fermentation according to Eijkman, 254 occurrence in polluted water and feces, type, 263 purification efficiencies as judged by removal of, 442 viability, calcium and sodium chlorides and, 448  
Bacterium Typhosum; H-ion concentration, growth and motility and, 368

- Bacterium Violaceum; 263  
Bagar, Kans.; water plant, 372  
Baltimore, Md.; main repairing, 148  
Barium Determination; as chromate, 142  
    as sulfate, 142  
Barometer; principle, 362  
Bassano Dam, Alberta, 377  
Baton Rouge, Miss.; sedimentation, 372  
Bearings; babbitt and, 252, 363  
    overheating of, 136  
    troubles and causes, 252  
Belgium; typhoid and, 445  
Bengal; algae and, 263  
Berkeley, Cal.; conflagration, 366  
Berlin-Neukölln; swimming pool, 446  
Bethlehem; Diesel engine and, 136  
Bicarbonate; titration of, 367  
Bleaching Powder; explosion and, 154  
Bloomington, Ill.; oxyacetylene blow-torch and, 366  
    typhoid epidemic, 152  
Bluefield Water Company; rates case, 262  
Boiler; coal vs. oil, 136, 253, 257  
    coal, pulverized and, 253, 455  
    efficiency, 453  
        air, excess and, 452  
        coal, pulverized and, 253  
    hammer test and, 136  
    inspection, 136  
    operation, instruments and, 363  
    output per lb. of fuel, 137  
    patches, position and durability, 136  
    see Books, New; Fuel Gas; Furnace; Oil, Fuel; Stoker Equipment  
Boiler Compound; anti-foaming, 373  
    see Boiler Feed Water  
Boiler Corrosion; caustic soda and, 362  
    dissolved gases and, 138, 465  
    electrolysis and, 362  
    H-ion concentration and, 465  
    mechanism of, 446  
    oxygen dissolved and, 138  
    permutite-softened water and, 443  
    pitting and, 140, 373  
    prevention, zinc plates and, 443  
    sodium carbonate and, 443  
Boiler Feed Water; caustic soda and corrosion, 362  
    circuits, 139, 361  
    dissolved gases and corrosion, 138, 465  
    heater, inspection of, 136  
H-ion concentration and, 139  
    corrosion and, 465  
measurement of, 362  
oxygen dissolved and corrosion, 138  
sodium carbonate and corrosion, 443  
softeners, inspection of, 136  
treatment; "algor" and, 139  
    Balcke process and, 250  
    colloids and, 139  
    compound, anti-foaming, 373  
    deaeration, 138, 139  
    doucet and, 255  
    lime-soda; foaming and, 465  
        limits, 139  
        scale and, 139, 465  
    permutite; corrosion and, 443  
    review and discussion, 448  
    "vaccination," 250  
zeolite; foaming and, 465  
    see Water Softening  
Boiler Foaming; anti-foaming compounds and, 373  
    lime-soda treatment and, 465  
zeolite treatment and, 465  
Boiler Plates; corrosion and pitting, 140, 373  
deterioration, 446  
strength and elasticity at elevated temperatures, 142  
testing of, 455  
    see Boiler Corrosion  
Boiler Scale; formation of, 446  
    lime-soda treatment and, 139, 465  
Boiler Tube; corrosion and pitting, 140, 373  
defects in, 140  
deterioration of, 446  
    see Boiler Corrosion  
Boldt (Chas.) Paper Mills; steam plant, 252  
Books, New;  
    A Hundred Years of Portland Cement, 466  
Analysis of Potable Waters, 155  
Annales des Services Techniques d'Hygiène de la Ville de Paris: Surveillance des Eaux pendant 1922, 466  
Cours de Distributions d'Eau et des Egouts, 155  
Cours d'Epuration des Eaux et Assainissement des Cours d'Eau, 466  
Elements of Water Bacteriology, 466  
Laws Relating to Waters; Sea, Tidal, and Inland, 466  
Modern Methods of Pipe Manufacture by the Centrifugal Process, 466

- Notions d'Hydrologie Appliquée à l'Hygiène: Bacteriologie des Eau, 466
- Precis de Chimie Physique, 155
- Pulverized Fuel, 466
- Pulverized Fuel and Efficient Steam Generation, 466
- The Principles of Irrigation Engineering, 466
- The Use of Copper and Brass for Domestic Water Services, 466
- Theorie de la Combustion et Utilization des Combustibles, 155
- Border Cities; filtration plant, new, 364
- Bourdon Gage Tube; distorted, unreliability of, 137
- Brass; corrosion and, 142
- Britain; oil engine drive and, 462  
water works practice, 250
- Brockville, Ont.; pumping, standby and, 463
- Bromphenol Blue; carbonate-bicarbonate titration and, 367
- Bronze; corrosion and, 142
- Buenos Aires; water supply, corrosion and, 142
- Buffalo; N. Y.; swimming pools and, 369
- Bull Run Lake; Portland, Ore., supply and, 376
- Burlington, Vt.; filtration and chlorination, 377
- Cadillac, Mich.; water supply, iodine content, goiter and, 151
- Cahokia; water treatment plant, 452
- Calcium Carbonate; saturated solutions, hydrolysis and, 447  
solubility, 447  
*see* Water, Calcium Carbonate
- Calcium Determination; as oxalate, 142
- Calcium Hydroxide; solubility, 447
- Calcium Sulfate; *see* Water, Calcium Sulfate
- California; Reclamation District 2047, pumping plant, 378  
State Board of Health, cross connections, regulations, 151
- Cambridge, Mass.; filtration plant, new, 147, 364
- Canada; Department of Health, water supplies on vessels, regulations, 365  
Research Council, concrete research and, 264
- Cape Pond; copper sulphate treatment of, 150
- Carbon Dioxide; *see* Carbonic Acid; Water, Carbon Dioxide
- Carbonate; titration of, 367
- Carbonate Equilibria; 447  
*see* Water, Calcium Carbonate; Carbon Dioxide
- Carbonation; *see* Water, Carbonation of
- Carbonic Acid; dissociation in water, 447  
*see* Water, Calcium Carbonate; Water, Carbon Dioxide; Water, Carbonation of
- Cardiff; incrustation, filtration to prevent, 450
- Cast Iron Pipe Publicity Bureau; water works system and, 149
- Catskill; *see* New York City
- Cement; *see* Books, New; Concrete
- Central Actuarial Bureau; sprinkler equipment and, 458
- Charlottesville, Va.; iron removal difficulties, 153
- Chatham, Ont.; coagulation, double and, 370  
water consumption, 370
- Check valves: on services, hot water systems and, law and, 379, 461
- Chemistry; *see* Books, New
- Chicago; chlorination and, 368  
meters and, 149, 377  
typhoid and, 152, 368
- water supply, pollution by Calumet River, 152
- Chickasha, Okla.; pipe cleaning and, 372  
well water supply system, 371
- Chimney; gases, water carbonation with, 442  
*see* Smoke Stack
- Chinquepin Creek; Spartanburg, S. C., supply and, 458
- Chloramine; *see* Water; Chloramine and
- Chlorination; *see* Water, Chlorination
- Chlorine; partition between water and gaseous phase, 253
- Cincinnati; iodization, estimated cost, 443  
Mariemont supply and, 148  
water supply, corrosion and, 148
- Clark Thermoregulator; improvement, 368
- Cleethorpes; bathing pool, 371
- Cleveland; iodization, estimated cost, 443
- Clifton, Ariz.; metering, consumption and, 379, 460
- Clinton, Ill.; water treatment plant, 372

- Coal; handling equipment, 453, 455  
low grade, incomplete combustion losses, 141  
pulverized; 253, 455  
furnace volume and, 136  
pulverizing and drying equipment, 455  
reserve, world's, 253  
storage; 363  
bituminous and, degradation, economy, and fire risk, 252  
equipment, 452, 453  
systems, 453  
Fedor protectometer and, 363  
wash water, purification and recovery of sludge, 142  
*see* Boiler; Books, New; Cost Coke Plant; *see* Waste, Industrial Colombo, Ceylon; main inerustation, prevention, 370  
Color: *see* Water, Color

- fuel and, coal vs. oil, 257  
 turbine drive and, 460  
 wells; air-lift and, 148  
     Layne system, 148  
 pumping plants, comparative, 363  
 purification plant, Shelby, O., 150  
 service pipe; cement-lined, 374  
     thawing of, 462  
 sodium aluminate, 465  
 softening, 151  
 steam; exhaust and live, 454  
     generation, coal vs. oil, 257  
 steam plant, capital, pulverized  
     coal and, 253  
 tile pipe, 377  
 waste detection, underground and  
     from plumbing, 258  
 water system, Mariemont, O., 148  
 water works; local conditions and,  
     380  
     operating costs, Greenville,  
         Miss., 148  
 wells for fire protection, Key West,  
     Fla., 373  
 Cottonwood River; Bagar, Kans.,  
     supply and, 372  
 Creamery; *see* Waste, Industrial  
 Cresol Red; carbonate-bicarbonate  
     titration, 367  
 Cross Connections; intestinal disease  
     and, 362  
     regulations re; California State  
         Board of Health and, 151  
         Washington State Board of  
             Health and, 362  
     typhoid and, 370  
 Ctenophore; feeding of, 250  
 Culverts; care of, 375  
 Curtis Bay; pollution prevention,  
     369  
 Cylindrospermum; India and, 263  
 Dam: arch; in Hartebeestport, S.  
     Africa, 379  
     multiple, Suorva Lakes, Lap-  
         land, 379  
     Swedish, 377  
 Assuan, flow through sluices, 462  
 composite, Bassano, Alberta, 377  
 Cottonwood River and, 372  
 earth; with creosoted plank core,  
     456  
     vegetation on slopes, 462  
 Gleno, Italy, failure of, 380  
 inspection and protection of, 375  
     *see* Spillway  
 Danvers; pipe, cement-lined and  
     cast iron, 378  
     meters, 378  
 Deaeration; *see* Water, Deaeration  
 Deferrization; *see* Water, Iron Re-  
     moval  
 Defiance; carbonation and, 441  
 Delaware, O.; chlorination, typhoid  
     and, 151  
     enteritis and, 151  
     water supply, 151  
 Denver, Col.; chlorination, 140  
 Depreciation; financing and, 262  
 Detroit, Mich.; swimming pools, 368  
     turbine specifications, 363  
     water works personnel, checking  
         up on, 458  
 Detroit Edison Co.; boiler plant, 452  
 Devon; boiler settings, construction  
     of, 454  
 Diarrhea; outbreak, cross connec-  
     tions and, 362  
 Diesel Engine; defects, diagnosis,  
     indicator diagrams and, 455  
     largest in America, 136  
     life of, 363  
     Nürnberg and; 362, 452  
         explosion and, 362  
 oil, fuel; design and, 141  
     testing, 141  
     operation of, 361  
 pump drive, 363, 379, 462  
     *see* Costs  
 Diffuser; of cemented sand, 442  
 Dilworth, Minn.; pipe cleaning and,  
     372  
 Dinitrophenol; indicators, pH range,  
     451  
 Dinobryon; Rockport, Mass., and, 150  
 Disease, Water-Borne; *see* Water,  
     Disease and  
 Doucil; water softening and, 255  
 Dredging; trench, cost, 377  
 Drifting Sand Filter; *see* Water  
     Filtration, Drifting Sand  
 Drilling; diamond, difficulties, 379  
 Drought; Connecticut and, 152  
     New York State and, 153  
     water-borne disease and, 153  
 Dubuque, Ia.; pumping plant im-  
     provements, 150  
 Dyeing, Textile; water, impure and,  
     141  
 Dysentery; Everett epidemic, cross  
     connections and, 362  
 Earth Dam; *see* Dam  
 East Bay Water Co.; publicity cam-  
     paign, 457  
 El Paso, Tex.; water plant, 456  
 Electric Power; cost, 378  
     generation of, 375  
     *see* Generator; Hydro-Electric  
         Plant; Turbo-Generator

- Electrical Connections, 251, 362  
Electrolysis; boiler corrosion and, 362  
Electro-Osmosis; water purification by, 147  
Elmhurst, Ill.; Diesel engine drive and, 379  
Emulsification; resistance to, testing, 252  
Endo; medium, pH recommended, 442  
Engine; double-eccentric, greater range of cutoff with, 137 reciprocating, inspection of, 136 *see Diesel Engine; Gas Engine; Gasoline Engine; Oil Engine*  
Engine Bearings; *see Bearings*  
England; *see Britain*  
Enteritis; Delaware, O., and, 151  
Euglena; India and, 263  
Everett, Wash.; typhoid and cross connections, 362  
Excavation; cost, hand vs. blasting, 152  
Keystone trenching machine and, economics, 374  
Extensions; mains and, Gary Water Company, and, 462  
New Bedford and, 379  
*see Water Supply, Finance*
- Feces; bacterial species in, 263  
Fedge Protectometer System; coal storage and, 363  
Federal Light and Traction Company, New York City; power plant inspection rules, 136  
Ferrous; *see Iron*  
Finance; *see Water Supply, Finance*  
Fire Protection; charges, practice, 149  
dead ends and, 366  
distribution system design and, 366, 458  
financing and, 376  
flow and, 458  
gate valves and, 458  
main size and, 366, 458  
pressure, practice re, 375, 458  
pumping engine; hydrant distribution and, 458  
    pressure and, 458, 459  
sprinkler systems; grading service for, 458  
    pressure required, 459  
water supplies, public, and, 363  
water waste and, 366  
water works, grading for, 458  
well water system, Key West, Fla., 373  
*see Hydrants*  
Fire Stream; pressure and, 458
- Fire Underwriters; hydrants, steamer outlets and, 376  
*see National Board of Fire Underwriters*  
Flanders; water supply and, 250  
Flue Gas; analysis; air control and, 253  
    combustion control and, 253  
    carbon dioxide content; combustion and, 253  
    efficiency and, 136  
temperature: excess air and, 452  
    oil firing and, 136  
    unburned gases, combustion and, 253  
Flushometer; *see Water Closet*  
Fish; sulfate and, 139  
*see Jelly Fish; Minnows; Perch*  
Forest; reforestation; growth of 6 species, comparative, 463  
    pine, red and white, insects and, 463  
*see Watershed*  
Furnace; construction, Devon, 454  
inspection, 136  
oil-fired, 252  
volume, pulverized coal and fuel oil and, 136  
*see Flue Gas*
- Galveston Electric Company; rates case, 262  
Gary Water Company; main extensions, 462  
Gas Engine; pump drive, 461  
Gaskets; for high pressure and temperature, 455  
Gasoline Engine; standby drive, 361, 463  
Generator; brushes, locating, 251  
inspection, 136  
*see Commutator; Turbo-Generator*  
Glass; sterilization, 442  
Gleno Dam, Italy; failure of, 380  
Goble Creek; Longview, Wash., future supply and, 461  
Goiter; iodine and; 151, 443, 444, 459  
    requirements, 371, 443  
    sea salt and, 443  
table salt and, iodized, 443, 444  
water supply and, Michigan, 151  
*see Water, Iodine*  
Grand Junction, Col.; reservoir construction, 378  
Great Bear Water Company; forestation, 463  
Great Lakes; vessels on, typhoid and, 365  
Great Northern Railway; pumping plant, Wenatchie, Wash., 456

- Greenville, Miss.; financing; metering and consumption; water works, 148
- Hartford, Conn.; distribution system; gratuitous water; leakage; under-registration of meters; rates, 374
- Herschel Emulsifier; description, 252
- Hobbs Brook; Cambridge, Mass., supply and, 147
- Hocanum River; pollution studies, 140
- Hot Water System; check valves on services and, law and, 379, 461
- Hydrants; charges, practice, 149
- distribution of, 366, 458
- fire engine and, 458
- grade, raising to, San Francisco and, 374
- pressure loss in, 459
- protection and care of, 374
- steamer outlets on; advisability, 375
- fire underwriters and, 376
- use, rules re, 375
- welding, 366
- Hydroelectric Plant; large, in Norway, 264
- operation of, 251, 360
- Hydrogen Electrode; advantages of quinhydrone electrode over, 451
- Hydrogen-Ion Concentration; bacteria, growth and motility and, 368
- corrosion and, 442
- theory, 373
- Hydrogen-ion Concentration Determination; quinhydrone electrode, advantages, 451
- Hydrogen Sulfide; *see* Sulfuretted Hydrogen
- Ice; melting point, absolute temperature, 448
- Illinois; typhoid and, 152
- Illinois Central Railroad; water plant; Baton Rouge, 372
- Clinton, 372
- Plaxton, 457
- Illinois State Department of Health; Division of Sanitary Engineering, report, 152
- Incrustation; lime-soda treatment and, 465
- see* Mains; Sand Incrustation
- Incubator; room, constant temperature, self-ventilating, 368
- India; algae, treatment for, 263
- Indicator; bromphenol blue, 367
- cresol red, 367
- dinitrophenols, pH range, 451
- methyl orange, 367, 444, 450
- nitrophenols, pH range, 451
- phenolphthalein, 367
- H-ion concentration range, 451
- Tillmans and Hublein's, 450
- p-sulfo-o-methoxybenzeneazodimethyl-a-naphthylamine, 450
- salicyl yellow, pH range, 451
- sensitiveness, alcohol and, 451
- thymol blue, 367
- Indicator Diagram; compression and expansion coefficients and, 251
- Insecticides; hardness of mixing water and, 143
- Interface; gas-liquid, particles in, observations on, 142
- International Filter Company; Peach Creek, W. Va., and, 373
- Iodine; goiter and, 371, 443, 444
- occurrence, 371, 443
- see* Water, Iodine and
- Iodization; *see* Water, Iodine and
- Iowa; water purification, status, 450
- water supplies, State Department of Health and, 450
- water works, grading for fire protection, 458
- Iowa State College; creamery waste purification studies, 145
- Iron Bacteria; chlorination and; lime and, 371
- main incrustation and, Colombo, Ceylon, 371
- Iron Corrosion; atmospheric, 452
- ferrous hydroxide; saturated solution, pH of, 364, 367
- ferrous metal and, 142
- graphitic softening, 258
- wrought iron and steel, comparative, 443
- see* Boiler Corrosion; Corrosion; Water, Aggressive; Water, Corrosive
- Irrigation; *see* Books, New
- Javelle; coke plant waste purification and, 444
- Jelly Fish; feeding of, 250
- Jewell Filter; in tropics, 446
- Key West, Fla.; well water fire protection system, 373
- Keystone Trenching Machine; economies of, 374
- Laboratory; water purification control and, 365

- Larch; Siberian, rate of growth, 463  
 Lauzon, Que.; mechanical filtration plant, 265  
**Law;** check valves on services, hot water system and, 379  
     see Books, New; Legal Decisions  
 Lawrence, Mass.; slow sand filters, winter operation, 373  
 Layne and Bowler; wells; Greenville, Miss., 148  
     Marshfield, Wis., 366  
     St. Petersburg, Fla., 256  
 Lead; corrosion in soil, 464  
     protective coatings, 464  
 Lead Poisoning; 460  
**Legal Decisions;** depreciation and, 262  
     disease, impure water and, 257  
     mine drainage, pollution and, 259, 262  
 Pennsylvania and, re water, in 1923, 262  
     rates and, 262  
     service pipe; check valves on, 461  
         laying of by consumer, 262  
     taxes, charging as operating expense, 262  
     valuation and, 262  
     see Law  
 Leptothrix Ochracea; see Iron Bacteria  
 Lime; active, determination, 143  
     analysis, 253  
     see Water, Lime  
 Linseed Oil; substitute, paint and varnish and, 446  
 Lithia Water; analysis, 254  
 Locomotive; runs, water conditions and; anti-foaming compounds and, 373  
     water treatment and, 465  
         value of, 373  
     see Boiler Feed Water; Boiler Foaming; Boiler Scale; Water Softening  
 Longview, Wash.; water supply, 461  
 Lubricators; mechanical, 140  
 Madras; water supplies, violet-producing organisms in, 263  
 Magnesium Determination; volumetric, 451  
 Main; break in, typhoid and, 152  
     cleaning, 366, 367  
     construction costs, 462  
     incrustation; filtration and, 450  
         and loss of capacity, prevention, 370  
     laying, across river, 462  
     size, fire protection and, 366, 458  
     statistics, 378  
     welding, in place, 148  
         see Incrustation; Pipe  
 Mariemont, O.; water supply, 148  
 Marloz; mineral water, analysis, 449  
 Marne River; coke plant waste and fish, 444  
 Marshfield, Wis.; water system, 366  
 Maryland; Bureau of Sanitary Engineering, Annual Report, 369  
 Massachusetts; Metropolitan District, water consumption, 463  
 Maumee River; Toledo supply and, 441  
 Mauritius; rain, substances in solution, 140  
 Maywood, Ill.; meter reading, inaccuracy, 257  
 Mechanicville, N. Y.; disease, impure water and, liability for, 257  
 Meillere's Reagent; silica and, 138  
 Methyl Orange; alkalinity determination and, 450  
     carbon dioxide, combined, determination and, 444  
     carbonate-bicarbonate titration and, 367  
     an improved, 450  
 Michigan; goiter, iodine in water supplies and, 151  
 Microscopic Organisms; feeding of, 250  
     see Water, Microscopic Organisms  
 Midwest Engine Corporation, Anderson, Ind.; centrifugal pump drive, data, 361  
 Milk; see Waste, Industrial  
 Milwaukee; chlorine-phenol taste, prevention, 369  
 Mine; see Waste, Industrial  
 Minnows; shallow-water, copper sulphate and, 151  
 Miskolc, Hungary; typhoid and chlorination, 444  
 Mississippi River; characteristics and treatment of, 452  
     sedimentation and, 372  
 Moncton, N. B.; chlorination, 265  
 Montana; State Agricultural College, concrete investigations, 264  
 Montpelier, Vt.; chlorination, 377  
 Mortar; cement, resistance to abrasion, 141  
 Moshassuck River; pollution and, 370  
 Motor; auxiliary drive, 455  
     bearings, relative merits, 452  
     brushes, locating, 251  
     pump drive; 154, 361, 363, 378, 455, 456, 457, 460

- see* Commutator; Costs; Pumping Plant  
 Mount Holly Water Company; disease, impure water and, liability for, 257  
 Mount Vernon; rain and snow, substances in solution, 449
- National Board of Fire Underwriters; grading schedule and, 458  
 sprinkler system equipment and, 458  
 Naugatuck River; pollution studies, 140  
 Navicula; India and, 263  
 Neodesha, Kans.; Municipal Light and Water Plant; Diesel engine operation, 361  
 New Albany, Ind.; main cleaning, 366  
 New Bedford, Mass.; extensions and, 379  
 mains, cost of, 378  
 New England; watershed forestation, pine trees and, 375  
 New Haven Water Company; forestation, 463  
 New Purification Works; *see* Water Purification Plant, New York City  
 New York City; Catskill scheme, geology of, 250  
 consumption, 258  
 waste control, 258  
 waste detection, 257  
 water works regulations, 375  
 New York State; drought in 1923, 153  
 Public Service Commission and minimum charge, 261  
 State Department of Health, Division of Sanitation, activities, 153  
 Newcastle, Va.; water works, cost per capita, 380  
 Nitrate; determination, 258  
 Nitrophenol; indicators, pH range of, 451  
 Norfolk, Va.; typhoid and, 137  
 Northern Pacific Railroad; pipe cleaning and, 372  
 Nürnberg; Diesel engine and, 362, 452
- Oakland, Cal.; *see* East Bay Water Company  
 Ogden City, Utah; water supply improvements, 148  
 Ohio; Public Service Commission and service charge, 261  
 State Health Department and water supplies, 443  
 water purification conference, 441  
 Ohio River; Portsmouth supply and, 442
- Oil; testing; emulsification, resistance to, 252  
 flash and fire point apparatus and, 252  
 turbine; deterioration in use, 361  
 maintaining quality in use, 452
- Oil Engine; drive, 251, 363, 372, 456, 462  
 fuel consumption, 462  
 life of, 363  
*see* Cost; Diesel Engine  
 Oil, Fuel; cost, 257, 377  
 flash point, importance, 251  
 reserve, world's, 253  
 viscosity; importance of; storage and, 251  
 Olentangy River; Delaware, O., supply and, 151  
 Ontario; port water supplies, 365  
 Provincial Board of Health, residual chlorine standard, 366  
 Oscillaria; India and, 263  
 Oxyacetylene Blow-Torch; welding and cutting, 366
- Paint; asphaltic, corrosion and, 464  
 brush and spray coats, durability, 447  
 leaded zinc, sulfur and, 447  
 linseed oil substitutes and, rust prevention and, 446  
 titanium oxide, sulfur and, 447  
 Paints, Coal Tar; corrosion and, 446, 464  
 Paris, France; spring supplies, 445  
*see* Books, New  
 Pasadena, Cal.; automobile operation, costs, 462  
 main construction, costs, 462  
 typhoid outbreak, 152  
 Peach Creek, W. Va.; water treatment plant, 373  
 Pennsylvania; Sanitary Water Board, powers, duties, policies, 259  
 stream pollution, 259  
 water, legal decisions re, in 1923, 262  
 Perch; white, copper sulphate and, 150  
 Perkiomen Creek, Philadelphia supply and, 463  
 Phenolphthalein; carbon dioxide, free and combined, determination of, 444  
 carbonate-bicarbonate titration and, 367  
 H-ion concentration range, 451  
 Tillmans and Hueblein's, 444  
 Philadelphia; filtration, double, 463

- meters and, 149  
 rainfall records, 460  
 water supply, report, 463
- Pine; rate of growth and freedom from insects, 463  
 yellow, use for water tanks, 457
- Pipe; connections, 365  
 inspection of, 136  
 laying; 149  
     costs; Keystone trenching machine and, 374  
     pressure and temperature, for high, 455  
     see Books, New; Main; Service Pipe
- Pipe, Cast Iron; cutting, oxyacetylene, 366  
 Danvers and, 378  
 joints; cement, 460  
     lead vs. substitutes, 457
- Pipe, Cement-Lined; Danvers and, 378  
     see Service Pipe
- Pipe, Cleaning; Dilworth, Minn., and Chickasha, Okla., and, 372
- Pipe Coating; pitch and asphaltic, for lead, 464
- Pipe, Concrete; centrifugally-cast, reinforced, 264  
 joint, flexible contraction, 264
- Pipe, Flow; see Water, Flow
- Pipe Joint; cement, 460  
 contraction, flexible, 264  
 lead vs. substitutes, 457
- Pipe, Lead-Lined; corrosion, resistance to; manufacture of, 259
- Pipe, Steel; riveted and lock bar, Portland, Ore., 376
- Pipeline; leakage, 377, 458  
 submarine; laying of, 376  
     leakage; cost, 377  
     water hammer, elimination of, 458
- Pitometer; leakage detection and, 257
- Plankton; see Water, Microscopic Organisms
- Plaxton, Ill.; water plant, 457
- Pleurobrachia Pileus; feeding of, 250
- Polarite; iron removal and, 139
- Portland, Me.; submarine pipeline, 376
- Portland, Ore.; financing; water works, 376
- Portland Cement Association; cement specifications, 465
- Portsmouth, O.; double coagulation, 442
- Potassium; determination, volumetric, 451
- Power; plant; heat balance, 252  
 inspection rules, 136
- water and steam, relative cost, reserve capacity, etc., 455
- Precipitate; entrainment by, 142
- Pressure; see Steam; Water Pressure Gage; spring, averaging readings of, 136
- Pretoria, S. Africa; Hartebeestport Dam, 379
- Ps. pyocanea; growth and motility, pH and, 368
- Public; co-operation, securing, 379  
 relations, 260
- Publicity Campaign; East Bay Water Company, and, 457
- Pump; duplex, steam valves for, 136  
     electric drive, 363, 456  
     oil engine drive, 372  
     selection of, 460  
     steam, cushion of, 136  
     triplex, motor drive, 456
- Pump, Air-Lift; study of, loss of head-velocity, 463
- well pumping and; 148  
     Layne system vs., 148, 256  
     oil engine drive, 456
- Pump, Centrifugal; characteristics, calculating, 360  
 curves, characteristic, 361  
 drive; Diesel, 379  
     electric, 154, 361, 378, 456, 457, 460  
     gasoline engine, 361, 463  
     steam, 361  
     turbine, 460
- wells and, 372, 373  
     see Cost
- Pump, Reciprocating; drive, cost; electric and oil engine, 460  
     steam, 154, 460
- Pumping; see Cost
- Pumping Plant; auxiliary drive, electric, 455
- California Reclamation District 2047, 378
- drive; Diesel engine, 363, 379, 462  
     electric; 154, 361, 363, 378, 455, 456, 457, 460  
     control, automatic, 148, 366, 456, 457  
     gas engine-producer, 461  
     gasoline engine, 463  
     oil engine, 372, 456, 460, 461  
     steam; 154, 361, 460  
     small units and, 462  
     turbine, 460
- Dubuque, Ia., improvements, 150  
 hot water and, vacuum and, 252
- St. Petersburg, Fla., and, 256
- standby drive, gasoline engine, 463
- statistics, 378

- Tulley, N. Y., and, 379  
 water stage variation of 60 feet, and, 456  
 water works and, 149  
*see* Cost; Pump; Wells
- Putman, Conn.; pumping, data on, 378
- Pyrometer; selection and use, 360
- Quebec City; water supply, 370
- Quebec, Province of; typhoid and, 265  
 water supplies, status of, 265, 370
- Questions and Answers; "Power" question box, 136
- Quinhydrone Electrode; advantages of, 451
- Railway; water supply regulations, 372  
 water treatment for, 465  
*see* Locomotive
- Rain; substances in solution, 140, 449
- Rainfall; records; Philadelphia, 460  
 Rockaway River Catchment area, 460  
 water shortage and, 460  
*see* Drought
- Ramsay, Mich.; typhoid epidemic, 153
- Rain-Gage; 375
- Records; *see* Rainfall; Water Works Records
- Red Bank, N. J., Pure Ice Manufacturing Company; oil engine drive, 251
- Red River; mud, sedimentation and, 372
- Reservoir; algal growths and, 370, 459  
 concrete, repairing, 379  
 connections, 365  
 covered; algal growths and, 459  
 water evaporation and, 460  
 water quality and, 459  
 water temperature, 460  
 erosion and, 463
- Grand Junction, Col., construction, features, 378  
 water elevation indicator, Telechron, 444
- Rhode Island; Board of Purification of Waters, Report, 1923, 370  
 pollution and, 370
- Roberts Water Engine; Bagar, Kans., and, 372
- Rochester, N. Y., disease, impure water and, liability for, 257  
 iodization; 257, 443
- Rock Island; water station, 371
- Rockaway River; rainfall on catchment area of, 1918, 460
- Rockport, Mass.; corrosion and red water troubles, 150  
 taste and odor due to microscopic organisms, copper sulphate treatment and, 150
- Royal Sanitary Institute; swimming pool water purification and, 371
- Royal School of Mines, South Kensington; corrosion research, 452
- Rutland, Vt.; chlorination, 377
- Sacramento; filter plant pumping station of, 378
- St. Charles River; Quebec City supply and, 370
- St. Jerome, Que.; typhoid, cross connections and, 370
- St. Johnsbury, Vt.; filtration, slow sand, 377
- St. Paul, Va.; water works, cost per capita, 380
- St. Petersburg, Fla.; pumping equipment; water supply and treatment, 256
- Salem, N. J.; filter sand cleaning, 152
- Salicyl Yellow; pH range, 451
- Salt; iodine occurrence in, 443  
 iodized, goiter and, 443, 444
- San Diego, Cal.; advance placement of services, 460
- San Francisco; hydrants, raising to grade, 374
- Sand; incrustation; carbonation and, 441, 442  
 coagulation and; alum, and iron-lime, 441  
 silica, solution of, 138
- Sanitary Engineers; *see* State Sanitary Engineers
- Sanitary Engineering; developments, recent, 263
- Sanitary Survey; *see* Water Supply Survey
- Santa Fe Railroad; water treatment at Bagar, Kans., 372
- Schuylkill River; Philadelphia supply and, 463
- Sea Water; salts; composition of; goiter and, 443
- Sedimentation; *see* Water, Sedimentation
- Service Charge; *see* Rates
- Service Pipe; advance placement, 377, 460  
 brass, 148  
 cement-lined wrought iron, cost, 374

- check valves on, hot water systems and, law and, 379, 461  
connections, 365  
fittings, lead-lined, 374  
"goose necks," lead, breakage of, 374  
laying of, by consumer, law and, 262  
regulations, New York City, 375  
thawing of, 462  
*see Books*, New  
Sewage; alkalinity of, 449  
Sewage Sludge; treatment, Mac-lachlan Process, 146  
Sewage Treatment; coagulation with alum, pH adjustment and, 451  
status, 264  
Shelby, O., Water Company; fire pressure, pumping engine and, 459  
iron removal at, 149  
Shrewsbury, Mass.; water shortage, 375  
Signal; *see Time Signal*  
Silt; settling basins, handling in, 377  
Yangtze River, self-purification and, 370  
Sluice; flow through, Assuan dam, 462  
Smoke Stack; iron, life of, factors, 360  
Snow; substances in solution, 449  
Sodium Aluminate; cost; lime-soda softening and, 465  
Softening; *see Water Softening*  
Soil; corrosion of lead in, factors, 464  
Southern Pacific Railroad; water plant, El Paso, Tex., 456  
Southington, Conn.; color, swamp drainage and, 152  
Southwestern Bell Telephone Company; rates case, 262  
Spartanburg, S. C.; water works, data, 457  
Spillway; Ambursen type, Bassano Dam, Alta., 377  
Spirogyra; India and, 263  
Spring; contamination, distance and, 445  
supervision of water supplies from, 445  
utilization of, 139  
Spring Valley Water Company; check valves on services, law and, 461  
Springfield, Mass.; reforestation, 371  
Water Commission, Report, 1923, 371  
Spruce; Norway, rate of growth, 463  
Star Drilling Machine; wells, Key West, Fla., 373  
State Sanitary Engineers' Conference; bathing place standards and, 369  
Steam; finding cost of exhaust as compared with live, 454  
pressure regulator, 361  
Steam Plant; high pressure, 143  
*see Boiler; Power*  
Steam Trap; installation and operation, 360  
Steel; alloys, non-corrosive, 364  
caustic soda and, 362  
embrittlement; caustic soda and, 154  
oxides and sulfides and, 155  
hydrogen, electrolytic, and, 362  
mild, action of salt solutions on, 140, 142  
stainless, corrosion and, 364  
*see Corrosion; Water, Aggressive; Water, Corrosive*  
Stock Yards; water supplies, 456  
Stoker Equipment; efficiency, computing, 455  
inspection, 136  
Stony Brook; Cambridge, Mass., supply and, 147  
Stream; erosion and, 463  
Stream Pollution; *see Water, Pollution of*  
Street Water; filtration and chlorination of, 375  
Sudbury, Mass.; aqueduct, seasonal flow, 462  
Sulfate; determination, 139  
*see Barium*  
Sulfide; oxidation to sulfate, 139  
Sulfuretted Hydrogen; concrete and, 144  
*see Water, Sulfuretted Hydrogen*  
Suorva Lakes, Lapland; multiple arch dams, 379  
Surface; *see Interface*  
Surge; chambers, design of, 265  
Surveying; *see Water Supply, Surveying*  
Swamp; drainage of; water color and, 152  
Sweden; arch dams, design features, 377  
Swimming Pool; Buffalo and, 369  
chemical studies, 143  
cleaning and refilling, frequency, 371  
Cleethorpes and, 371  
construction standards, 369  
design, 250  
Detroit and, 368  
water purification; aeration and, 371  
chlorination and, 445, 446  
equipment, 250  
filtration and; 371

- rapid sand, 445, 446  
 ultra violet ray treatment, 368  
 water quality; bathing suits and, 143  
 standards, 369  
 Switch-Board Equipment; inspection, 136
- Tabellaria; Rockport, Mass., and, 150
- Tamaseu River, Transylvania; 254
- Tanks; inspection, 136  
 water, creosoted yellow pine for, 457
- Taxes; financing, 262
- Telechron Electric Position Transmitter; description, 444
- Thermoregulator; Clark, an improvement of, 368
- Thymol Blue; carbonate-bicarbonate titration, 367
- Time Signal; improvised, 362
- Titration; electrometric; advantages of quinhydrone electrode over H-electrode, 451  
 apparatus, 450
- Tohickon Creek; Philadelphia supply and, 463
- Toledo; water purification, 1916-1923, 441
- Toronto; water works operation, 366
- Transformers; connections, checking, 251  
 operation of, 360
- Trench; sheeting, 462  
*see* Dredging; Excavation
- Tulley, N. Y.; pumping plant, 379
- Turbine; oil, deterioration in use, 361  
 operation of large, 360  
 pump drive, 460  
 specifications, Detroit and, 363  
 vibration, correcting, 360
- Turbine, Steam; aligning, 251  
 inspection, 362  
 oil, maintaining quality in use, 452  
 pump drive, 361  
 velocity and pressure, relationship, 252
- Turbine, Water; large, in Norway, 264
- Turbo-Generator; inspection of, 136
- Typhoid; Belgium and, 445  
 Bloomington, Ill., and, 152  
 Chicago and, 152, 368  
 chlorination and, 151, 444  
 Connecticut and, 151  
 cross connections and, 362, 370  
 Delaware, O., and, 151  
 Everett, Wash., and, 362
- Great Lake vessels and, 365  
 Illinois and, 152  
 Montreal and, 265  
 Miskolez, Hungary, and, 444  
 Norfolk, Va., and, 137  
 Pasadena and, 152  
 pollution and, warning, inefficacy of, 153  
 Quebec Province and, 265  
 Ramsay, Mich., and, 153  
 St. Jerome, Que., and, 370  
 statistics, of 69 United States cities, 1920-1923, 137  
 Virginia and, 153  
 water main, break in, and, 152  
 water shortage and, 153  
*see* Water, Disease and
- Ultra-Violet; *see* Water, Ultra-Violet Radiations and
- Union Electric Light and Power Company; water treatment, Cahokia, 452
- United States; Department of Commerce, Bureau of Standards, concrete investigation, 264  
 Naval Academy, Annapolis, Md., iron removal plant, 368  
 War Department, boilers, conversion to oil, 136
- Utility; public relations, 260  
 valuation and rates, 262  
*see* Water, Rates
- Valuation; rates and, 262
- Valves; pressure; high and, 455  
 regulating, water hammer, elimination, 458  
 safety; leakage from; principles of, 251  
 seat, bevelled vs. flat, 136  
 steam, for duplex pumps, 136  
 street boxes, resetting, 374  
 temperature, high and, 455  
*see* Check Valves
- Varnish; linseed oil substitutes and rust prevention, 446
- Vermont; water supplies, 377
- Vessel; corrosion of, 142  
 typhoid on, Great Lakes, 365  
 water regulations, 365
- Vibrio Cholerae; capillary spaces, penetration, 368
- Vibrio Percolans; capillary spaces, penetration, 368
- Virginia; typhoid; water supplies, 153
- Virginia State Board of Health; Division of Sanitary Engineering, activities, 153

- Wagon Wheel Gap, Col.; run-off, denudation and, 463  
 Waltham Abbey; filtration and iron removal plant, 139  
 Washington State; cross connection, Board of Health and, 362  
 Waste, Industrial; alcohol, industrial, and, 369  
 ammonia still, treatment to prevent taste with chlorine, 369  
 asphalt refinery and, 369  
 cannery and, 369  
 chemical, 369  
 chenopodium plant and, 369  
 coke oven and, 260  
 fish and, 444  
 Ohio Conference and, 441  
 purification, Javel water and, 444  
 congoeum plant and, 369  
 creamery and, 369  
 purification by activated sludge process, 145  
 garbage reduction plant and, 369  
 gas works and, treatment and disposal, 369  
 milk plant and; pollution by; treatment of; 254  
 mine drainage and, legal decision, 259, 262  
 oil and, prevention, 370  
 oil refinery and, 369  
 potash works and, disposal, 449  
 Rhode Island and, 370  
 steel rolling mill and, 369  
 tannery and, 369  
 taste and, 149, 369  
 treatment; sludge removal; 465  
 Water, Acid; bacterial content and, 140  
*see* Waste, Industrial; Water, Carbon Dioxide; Water, Hydrochloric Acid  
 Water, Aeration; aerator; cascade, 256  
 coke, 149, 371  
 spray nozzles, 153  
 after-precipitation, and, 145  
 Cambridge and, 148  
 carbon dioxide removal and, 149, 445  
 iron removal and, 145, 149, 153, 368, 371  
 organic matter and, 370  
 sulfuretted hydrogen and, 256  
 swimming pool water and, 371  
*see* Diffuser  
 Water, After-Precipitation; aeration and, 145  
 carbonation and, 441, 442  
 Water, Aggressive; carbon dioxide and; hardness and; pH and; iron solubility and; treatment for, 456  
*see* Water, Corrosive  
 Water, Air and; *see* Water, Aeration  
 Water, Alkalinity; soda ash and, 148  
 Water, Ammonia; free and albuminoid, potable water and, 146  
 Water, Analysis; alkalinity; 450  
 bicarbonate, carbonate, and caustic, 145  
 boron, detection, 449  
 carbon dioxide, free and combined, 444  
 gases, dissolved, 137  
 hardness; potassium oleate method, 144  
 potassium palmitate method, 144, 453  
 soap method; 143  
 modified, 144, 255, 453  
 manganese, 153  
 methods; rapid, for boiler feed, 372  
 standard, Am. Ry. Eng. Assoc. and, 372  
 uniform, adoption of, 459  
 oxygen demand, industrial wastes and, 140  
 oxygen dissolved; method for small quantity of water, 137  
 waste industrial and, 140  
 silica, 138  
 tar acids and bases, age of sample and, 141  
*see* Bicarbonates; Books, New; Carbonation; Magnesium; Nitrate; Potassium  
 Water, Appearance; quality and, 140  
 Water, Bacteria; acids and, 140  
 calcium salts and, 140  
 violet producing, 263  
*see* Bacterium Coli; Books, New  
 Water, Bacteriological Examination; counts; number plate and, 442  
 uncertainty of, 254  
 fermentation according to Eijkman, 254  
 technique, 442  
 Water, Bicarbonates; algae and, 263  
 Water, Boiler Feed; *see* Boiler Feed Water  
 Water, Calcium Carbonate; deposition electrolytically, corrosion and, 451  
 H-ion concentration and, 447  
 precipitation, carbon dioxide removal and, 145

- solubility, 447  
 solution, hydrolysis of saturated, 447  
 Water, Calcium Carbonate-Carbon Dioxide; aggressivity and, 456  
 pH and, 447, 456  
 Water, Calcium Hydroxide; solubility of, 447  
 Water, Calcium Salts; bacterial content and, 140  
 Water, Calcium Sulfate; pH and, 447  
 Water, Carbon Dioxide; aggressive, 456  
 algae and, 263, 370  
 corrosion and, 367  
 dissociation and, 447  
 hardness and, 456  
 H-ion concentration and, 367, 447, 456  
 iron deposition and, 153  
 Water, Carbon Dioxide Removal; aeration and, 150, 445  
 after-precipitation and, 145  
 aggressive, by aeration or with soda ash, 445  
 lime and, 370  
 Water, Carbonation; chimney gases and, 442  
 coagulation and; cost of; sand incrustation and, 441  
 Water, Chloramine and; aftergrowths and, 140  
 Water, Chlorination; aftergrowths and, 140, 442  
 amoebae and, 446  
 apparatus and control, 365  
 injection by water motors, 265  
 Chicago and, 368  
 color and, 446  
 dechlorination, 459  
 double, aftergrowths and, 442  
 Iowa and, 450  
 iron bacteria and, 371  
 manganese removal and, 445  
 microscopic organisms and, 446  
 odor and, 446  
 Quebec and, 265  
 residual chlorine and, 366  
 safety, use as factor of, 442  
 street wash and, 375  
 superchlorination and, 459  
 swimming pool water and, 445, 446  
 taste; dose and, 149  
 phenol and, prevention, 369  
 typhoid and, 151, 444  
 Vermont and, 377  
 see Javel  
 Water Closet; flushometer, regulations, N. Y. City, 375  
 Water, Coagulation; accelerating with filter wash water, 148  
 algae and, 370  
 carbonation and, 441  
 double, 370, 441, 442  
 floc; composition of, 254, 448  
 insolubility, pH and, 448  
 H-ion concentration; adjusting with acid, 451  
 dose and, 445  
 floc, insolubility range, 448  
 mechanism of, 445  
 sand incrustation and; alum and lime-iron, 441  
 sediment, utilization of, 445  
 see Coagulation  
 Water, Color; iron and, 153  
 removal, chlorination and, 446  
 swamp drainage and, 152  
 Water Company; problems of, 457  
 Water Consumption; Arizona and, 461  
 Chatham, Ont., and, 370  
 Clifton, Ariz., and, 379, 460  
 Greenville, Miss., and, 148  
 Massachusetts Metropolitan District and, 463  
 metering and, 148, 376, 379, 460  
 New York City and, 258  
 Portland, Ore., and, 376  
 pressure and, 148, 461  
 Water Cooling Equipment; inspection, 136  
 Water, Copper Sulphate Treatment; India, ineffectiveness in, 263  
 microscopic organisms and, Rockport, Mass., and, 150  
 shallow-water minnows and white perch and, 150  
 Water, Corrosive; carbon dioxide and, 367  
 gases, dissolved and, 465  
 hydrochloric acid and, 367  
 hydrogen-ion concentration and, 364, 367, 443, 465  
 oxygen dissolved and, 138, 263, 364, 367, 443  
 pipe and, 459  
 protective film of carbonate, deposition of electrolytically, 451  
 Rockport, Mass., and 150  
 taste and, 149  
 temperature and, 138  
 see Water, Aggressive  
 Water, Deaeration; agitation in vacuum and, 138  
 contact with oxidizable metal and, 138  
 corrosion control by, 263  
 heat and, 139

- Water, Deactivation; *see* Water, Deaeration  
 Water, Deferrization; *see* Water, Iron Removal  
 Water, Disease and; cross connections and, 362, 370  
 Everett, Wash., and, 362  
 impure water and, liability, court decision, 257  
 pollution and, 153  
 water shortage and, 153  
*see* Typhoid  
 Water Distribution; system; design; 149, 364  
 fire protection and, 366, 458  
 maintenance, 364  
*see* Books, New; Mains  
 Water, Drinking; *see* Water, Quality  
 Water, Filtration; Border Cities and, 364  
 Burlington, Vt., and, 377  
 Clinton, Ill., and, 372  
 discussion, 363  
 incrustation, prevention by, 450  
 iron removal and, 368  
 plant construction, activity in, 459  
 Quebec and, 265  
 Spartanburg, S. C., and, 458  
 street wash and, 375  
 swimming pool water and, 371  
 turbidity, limits, 441  
 wash water, separation of impurities and utilization, 453  
*see* Bacteria; Sand Incrustation  
 Water Filtration, Double; Philadelphia and, 463  
 Water Filtration, Drifting Sand; purification and, 370  
 Water Filtration, Mechanical; *see* Water Filtration, Rapid Sand  
 Water Filtration, Rapid Sand; B. coli, limits, 442  
 Cambridge, Mass., and, data and cost, 147, 364  
 Candy type, iron removal and, 139  
 gravel, depth and prevention of shifting, 150  
 Jewell, in the tropics, 446  
 Lauzon, Que., and, 265  
 operators and, 446  
 Philadelphia and, 463  
 sand, cleaning with caustic soda, 152  
 Shelby, O., and, 150  
 study of, 442  
 swimming pool water and, 445  
 wash water; conserving; coagulation and, 147  
 raw water, use of for, 446  
 Wheeler bottom and, 147  
 Water Filtration, Slow Sand; iron; deposition in, 153  
 removal and, 371  
 open, operation in winter, 373  
 Philadelphia and, 463  
 St. Johnsbury, Vt., and, 377  
 Water, Flow; measuring; Allen salt velocity method, 454  
 Vee-notch weir, with recorder and integrator, 461  
 Water, Gases Dissolved; corrosion and, 465  
*see* Water, Aeration; Water, Carbon Dioxide; Water, Deaeration; Water, Oxygen Dissolved  
 Water, Gratuitous; Hartford, Conn., and, 374  
 Water, Ground; contamination, distance and, 445  
 tracing, boric acid as substitute for fluorescein, 449  
 yield, determining, 375  
*see* Well  
 Water Hammer; eliminating from pressure regulating valve; leakage and, 458  
 Water, Hardness; aggressivity and, 456  
 carbon dioxide, relationship, 456  
 insecticides and, 143  
 softening and, 151  
*see* Water, Alkalinity; Water Analysis; Water, Softening  
 Water, Hydrochloric Acid; corrosion and, 367  
*see* Water, Acid  
 Water, Hydrogen-ion Concentration; aggressivity and, 456  
 calcium carbonate and sulfate and, 447  
 carbon dioxide and, 367, 447  
 coagulation and, 445, 448, 451  
 corrosion and, 364, 367, 443, 465  
 Water, Iodine and; goiter and, 151, 444  
 iodization, 371  
 advisability of, 257, 443  
 Ohio Conference and, 441  
 cost, estimated, at Cincinnati and Cleveland, 443  
 Rochester and, 257, 443  
 occurrence, 371  
*see* Goiter  
 Water, Iron; deposition in slow sand filters, carbon dioxide and oxygen and, 153  
 main incrustation and, 370  
 taste and, 149  
 Water, Iron Removal; aeration and, 145, 149, 153, 368, 370

- filtration and; 149, 368, 370  
     Candy filters and, 139  
     lime precipitation and, 368  
 Water Level; electric indicator, Telechron, 444  
 Water, Lime; carbon dioxide and, 370  
     iron and, 368  
     iron bacteria and, 371  
     well disinfection and, 445  
 Water Main; *see* Main  
 Water, Manganese Removal; biological, chlorination and, 445  
     filtration through manganese dioxide, 445  
 Water, Meter and; Chicago and, 149, 377  
     Clifton, Ariz., and, 379, 460  
     consumption and, 148, 376, 379, 460  
     Danvers and, 378  
     disc type, 373  
     Greenville, Miss., and, 148  
     maintenance costs, 149  
     oscillating piston type, 373  
     Philadelphia and, 149  
     Portland, Ore., and, 376  
     positive type, 373  
     procedure, 149  
     reading, accuracy of, 257  
     regulations, New York City and, 375  
     repairing, practice, 149  
     selection of, 373  
     size, excess capacity charge and, 374  
     under-registration, size and, 374  
     velocity type, 254, 373  
     volume type, 254  
     warm water, type for, 254  
     worm wheel type, 254  
 Water, Microscopic Organisms; acid and, 263  
     bicarbonates and, 263  
     carbon dioxide and, 263, 370  
     chlorination and, 446  
     coagulation and, 370  
     copper sulfate and, 150, 263  
     lime and, 263, 370  
     photosynthesis by, 370  
     removal, Charlottesville, Va., 153  
     reservoirs, covered and, 459  
     shallow water and, 263  
     taste and, 149  
     temperature and, 263  
     *see* Microscopic Organisms  
 Water, Mineral Content; taste and, 149  
 Water, Nitrite; potable water and, 146  
 Water, Odor; chlorination and, 446  
     microscopic organisms and, copper sulfate and, 150  
     organic matter and ice-bound river and, 441  
     removal, Charlottesville, Va., 153  
 Water, Organic Content; aeration and, 370  
     odor and, 441  
     precipitation by sulfates, 139  
     taste and, 149, 441  
 Water, Oxygen Dissolved; corrosion and, 138, 263, 364, 367, 443  
     iron deposition and, 153  
 Water, Oxygen Removal; *see* Water, Deaeration  
 Water, Phenol; chlorine and, taste prevention, 369  
 Water, Pollution; age, bacterial species and, 263  
     Australia and, 369  
     dilution factor and, 140  
     disease, intestinal and, 153  
     indicators of; bacterial species, 263  
     oxygen demand and oxygen dissolved tests, 140  
     milk wastes and, 254  
     Rhode Island and, 370  
     self-purification and, silt and, 370  
     spring floods and, 149  
     storage and, 146  
     of streams, in Pennsylvania, 259  
     warning re, inefficacy of, 153  
     *see* Waste, Industrial  
 Water Pressure; consumption and, 148, 461  
     fire protection and, 458  
         buildings, height of, and, 458  
         pumping engine and, 458, 459  
         sprinkler system and, 459  
     main cleaning and, 367  
     oscillating, surge tanks and, 265  
     practice re, 375  
     statistics, 600 cities, 378  
     *see* Pressure Gage  
 Water Purification; Cahokia and, 452  
     efficiencies, relative, bacterial counts and *B. coli* tests, 442  
     electro-osmotic process and, 147  
 Iowa and, 450  
     laboratory control of, 365  
     pollution and, study of, 442  
 Quebec and, 265  
     status of, 264  
     *see Books, New; Water, Aeration; Water, Chlorination; etc.*  
 Water Purification Plants, New; Bagar, Kans., 372  
     Border Cities, 364  
     Cambridge, Mass., 147, 364  
     Clinton, Ill., 372

- Lauzón, Que., 265  
Rock Island, 371  
Water Quality; requirements, 139, 149  
*see* Water Standards  
Water Rate; schedule, construction of, 261  
service charge vs. minimum charge, 260  
valuation and, 262  
*see* Utility  
Water, Sedimentation; Bagar, Kans., and, 372  
discussion of, 365  
iron removal and, 150, 371  
Peach Creek, Va., and, 373  
Portsmouth, O., and, 442  
silt and, 377  
tanks, conical bottom and, 371, 372  
*see* Water, Coagulation  
Water, Self-Purification; Yangtsze River and, silt and, 370  
Water Shortage; Disease and, 153  
rainfall and, 460  
Shrewsbury, Mass., and, 375  
Water, Silica; geological formation and, 138  
Water, Soda Ash; aggressive carbon dioxide and, 445  
Water, Sodium Carbonate; brittling of boiler metal and, 443  
Water Softening, 456  
accelerating, 453  
agitation and, 372  
Clinton, Ill., and, 372  
cost of, 151  
discussion of, 143, 151  
doucet and, 255  
lime-soda; illness and, 373  
    incrustation and, 465  
    limits of, 139  
    sodium aluminate and, 465  
    reactions, reversibility of, 465  
    temperature and, 465  
permutite, brittling of boiler metal and, 443  
*see* Boiler Feed Water; Water, Carbonation  
Water, Spring; of unusual composition, 137  
Water Standards; Canadian Department of Health and, 365  
United States Public Health Service and, modification, 459  
Water, Sterilization; electro-osmotic process, 147  
*see* Water Chlorination; Water, Ultra-Violet Radiation  
Water Storage; bacterial species as index of, 263  
pollution and, 146  
Water, Sulfate; precipitation of organic matter and, 139  
Water, Sulfuretted Hydrogen; removal, aeration and, 256  
taste and, 256  
Water Supply; impure, liability for, court decisions, 257  
Water Supply Finance; depreciation and, 262  
fire protection and, 149, 376  
Greenville, Miss., and, 148  
main extension and, 374, 378  
Portland, Ore., and, 376  
private water company and, 457  
service charge and, 261  
shut-off charge and, 375  
Spartanburg, S. C., and, 457  
taxes and, 262  
valuation and, 262  
*see* Water Rate  
Water Supply, Source; selection, 149  
Water Supply, Surveying; aerial, 151  
sanitary, interpretation of, 139  
Water, Taste; corrosion and, 149  
chlorine dose and, 149  
industrial wastes and, 149  
iron and, 149  
microscopic organisms and, 149  
    copper sulfate and, 150  
mineral salts and, 149  
organic content and, 149, 441  
storage and, 149  
sulfuretted hydrogen and, 256  
Water, Temperature; algae and, 263  
corrosion and, 138  
reservoirs, covered and, 460  
Water Treatment; *see* Water, Iodine and; Water, Lime; Water, Soda Ash; etc.  
Water, Turbidity; filtration efficiency and, 441  
Water, Ultra-Violet Radiation; swimming pool water and, 368  
Water, Waste; control of from fixtures; cost; staff required, 258  
detection; aquaphone and, 257  
cost, 258  
pitometer and, 257  
fire services and, 366  
    gate valves and, 458  
Greenville, Miss., and, 148  
meters and, 148  
pressure and, 148  
Water Works; fire protection, grading for, 458  
the investor and, 260  
peak load and, 374

- Water Works Accounting; Portland, Ore., and, 376  
private company and, 457  
*see* Water Supply Finance
- Water Works Officials; checking up on, 458  
selection of, 149  
superintendent, responsibilities, 379
- Water Works Practice; British and American, comparison of, 250
- Water Works Records; planning, 149
- Watershed; care of, 375  
denudation, run-off and, 463  
forestation, 371, 375
- Weir; Vee-notch for measuring flow, 461
- Well; bore well, deep, 379  
disinfection with lime, 445  
drilling machine, Star, 373  
fire protection system, 373  
gravel, 457  
Layne and Bowler, 148, 256, 366  
pumping, 366, 371, 372, 373, 379  
air lift and, 148, 256, 456  
centrifugal pump and, 457
- Layne system, 148, 256  
triplex pump and, 456
- screens for, 148, 366
- water, removal of gas from, 136
- yield, determining, 375
- Welland, Ont.; water supply, canal and, 463
- Wenatchie, Wash.; pumping plant, 456
- Westinghouse Electric and Manufacturing Company; steam turbine specifications and instructions, 362
- Wheeler Bottom; Cambridge, Mass., and, 147
- Winter Garden, Fla.; well water system, 462
- Yale School of Forestry; reforestation and, 463
- Yangtsze River; pollution, silt and, 370
- Zeolite; chemical exchange reactions, 154  
manufacture of, 454

